Open MCQs of

Mathematics 11

PECTAA

Dedicated to

Unsung Heroes of Pakistan's Classrooms

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Dedicated to

Unsung Heroes of Pakistan's Classrooms

- To every **college mathematics teacher** who spends late nights grading papers,
- To every **educator** explaining *calculus* and *trigonometry* for the hundredth time with patience,
- To the **mentors** shaping future engineers, doctors, and scientists —***without recognition or fair rewards***—

Version History

20260226:

- MCQs of Unit 09 have been added.
- Many equations and typo errors have been removed.
- Page size changed to A5 for better view on mobile.
- Answers of chapter added.

20250721:

- Initial release

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Table of Contents

Unit 01: Comple Numbers

1) $\sqrt{3}$ is

   A) Rational
   B) Irrational ◆
   C) Integer
   D) Prime

2) Product $\sqrt{-2}\times\sqrt{-2}$ is equal to

   A) -2 ◆
   B) 2
   C) 0
   D) 4

3) $|Z_1 Z_2| =$

   A) $|Z_1||Z_2|$ ◆
   B) $|Z_1|+|Z_2|$
   C) $|Z_1|-|Z_2|$
   D) $\dfrac{|Z_1|}{|Z_2|}$

4) If x < y, y < z then

   A) x > z
   B) x < z ◆
   C) x = z
   D) none of these

5) $|Z_1 + Z_2|$

A) $= |Z_1| + |Z_2|$

B) $> |Z_1| + |Z_2|$

C) $\leq |Z_1| + |Z_2|$ ◆

D) $= |Z_1| \times |Z_2|$

6) $(-\,i)^5$ is

A) i ◆

B) -1

C) 1

D) $-i$

7) The solution set of $5x + 8 = 0$, when $x \in \mathbb{N}$ is

A) non-empty set

B) $-\frac{8}{5}$

C) $\frac{8}{5}$

D) empty set ◆

8) For all $x, y, z \in \mathbb{R}$, if $(x\,y)\,z = x\,(yz)$ then this property is called

A) Commutative property under multiplication

B) Associative under multiplication ◆

C) Distributive under multiplication

D) Commutative under addition

9) The additive inverse of a complex number $x + iy$

A) $x - iy$

B) $x + iy$

C) $-x - iy$ ◆

D) $\frac{x}{x^2+y^2} + i\frac{-y}{x^2+y^2}$

10) The conjugate of a complex number $5i$

A) -5
B) $5i$
C) $-5i$ ◆
D) 5

11) The property used in this equation $3 \times 7 = 7 \times 3$ is called

A) Closure law
B) Commutative law for addition
C) Commutative property w.r.t multiplication ◆
D) Identity

12) The additive inverse of (-x, -y) is

A) (-x, -y)
B) (x, y) ◆
C) (-x, 0)
D) (x, -y)

13) The property used in the equation 8 + 0 = 8 is called

A) Commutative
B) Associative
C) Additive Identity ◆
D) Additive Inverse

14) For all a, b, c ∈ R, if (a + b) + c = a + (b + c) then the property is called

A) Commutative under addition
B) Associative w.r.t addition ◆
C) Distributive under addition
D) None of these

15) The inverse of an element 'a' under addition is

A) $\frac{1}{a}$

B) - a ◆

C) 1

D) 0

16) The additive identity is

A) 0

B) – 1

C) 1 ◆

D) none of these

17) The product of two conjugate complex numbers is always a

A) Real number ◆

B) Complex number

C) Irrational number

D) Natural number

18) The sum of two conjugate complex numbers is always a

A) Real number ◆

B) Irrational number

C) Complex number

D) Natural number

19) $\left|\frac{1+2i}{2-i}\right| =$

A) 1 ◆

B) 5

C) ¾

D) 5/3

20) If Z_1, Z_2 be complex numbers then $\overline{Z_1 + Z_2} =$

A) $\overline{Z_1} - \overline{Z_2}$

B) $\overline{Z_1} + \overline{Z_2}$ ◆

C) $\overline{Z_1} + Z_2$

D) $Z_1 - \overline{Z_2}$

21) If $z = (a, b)$, then $z^{-1} =$

A) $(a, -b)$

B) $(-a, b)$

C) $\left(\frac{a}{a^2+b^2}, \frac{-b}{a^2+b^2}\right)$ ◆

D) $\left(\frac{-a}{a^2+b^2}, \frac{b}{a^2+b^2}\right)$

22) If $z = a + bi$, then $|z| =$

A) $a^2 - b^2$

B) $a^2 + b^2$

C) $\sqrt{a^2 - b^2}$

D) $\sqrt{a^2 + b^2}$ ◆

23) If z_1 and z_2 are any two complex numbers then

$|z_1| - |z_2|$

A) $< |z_1 + z_2|$

B) $\leq |z_1 + z_2|$ ◆

C) $> |z_1 + z_2|$

D) $\geq |z_1 + z_2|$

24) $(-i)^{15} =$

A) 1

B) -1

C) i ◆
D) $-i$

25) If $z_1 = (a, b)$ and $z_2 = (c, d)$ then $z_1 z_2 =$
A) $(ac - bd,\ ad + bc)$ ◆
B) $(ac + bd,\ cd - bc)$
C) $(ad + bc,\ ac - bd)$
D) $(ad - bd,\ ac + bd)$

26) $2x^2 + 3y^2 =$
A) $(2x + 3iy)(2x - 3iy)$
B) $(\sqrt{2}x + \sqrt{3}iy)(\sqrt{2}x - \sqrt{3}iy)$ ◆
C) $(2x - 3y)(2x + 3y)$
D) $(\sqrt{2}x + \sqrt{3}y)(\sqrt{2}x - \sqrt{3}yi)$

27) $\pi \in$ _________
A) $\mathbb{N}$
B) $\mathbb{Q}$
C) $\mathbb{Q}'$ ◆
D) none

28) $\forall x \in R, x = x$ is called _______ property.
A) symmetric
B) reflexive ◆
C) transitive
D) none

29) Every recurring and terminating decimal is in set ______
A) $\mathbb{Q}$
B) $\mathbb{Q}'$ ◆
C) $\mathbb{N}$
D) none

30) The complex No. (a + ib) can be written as _____

A) (a, ib)
B) {a, b}
C) (a, b) ◆
D) [a, b]

31) The imaginary part of the complex number (b, a) is ______

A) ia
B) b
C) a ◆
D) none

32) If $z = i$, then $\bar{\bar{z}} =$

A) I ◆
B) $-i$
C) ±1
D) none

33) $If \; Z = -\overline{Z} \; then \; Z \; is$ __________

A) real
B) imaginary ◆
C) neither type

34) $If \; Z = -1 - i \; then \; \overline{Z} =$ _________

A) (-1, -1)
B) (-1, 1) ◆
C) (1, -1)
D) none

35) $|i| =$ __________

A) – 1
B) 1 ◆
C) 0
D) i

36) The magnitude of $\frac{1+2i}{2-i}$ is ________

A) $5 + 2i$
B) – 1
C) 1 ◆
D) none

37) If x = 0, then multiplicative inverse of x is _______

A) $\frac{1}{x}$
B) – x
C) 1
D) none ◆

38) The real & imaginary part of $\frac{1}{2+i}+\frac{3}{2-i}$ is _____

A) $(\frac{5}{8}, \frac{2}{5})$
B) $\frac{5}{8}, \frac{-2}{5}$
C) $\frac{8}{5}, \frac{2}{5}$ ◆
D) none

39) The value of i^n = _______ where n is an odd No.

A) $-i$
B) $+i$
C) ± I ◆
D) Non

40) If the area of triangle is 16, formed by the points Z, Z+iZ and iZ in a complex plane, then $|Z|$ = ______

A) 16
B) $5\sqrt{3}$
C) $4\sqrt{2}$ ◆
D) none

41) if $x + iy = 5 - 6i$, then y = ________
A) – 6 ◆
B) 6
C) 0
D) None

42) A real number is always
A) A natural no
B) Positive integer
C) Rational number
D) Complex number ◆

43) The property used in the equation 7.8 + (- 7.8) = 0 is
A) Commutative
B) Associative
C) Additive Identity
D) Additive inverse ◆

44) The conjugate of – 6 + 3i
A) – 6 – 3i ◆
B) – 6 + 3i
C) 6 + 3i
D) 6 – 3i

Unit 02: Functions and Graphs

1) If $x \in L \cup M$, then

A) $x \notin L$ or $x \notin M$
B) $x \notin L$ or $x \in M$
C) $x \in L$ or $x \notin M$
D) $x \in L$ or $x \in M$ ◆

2) Let A ={a, b, c, d}, B ={b, c, d} then $A \cap B$ =

A) {b, c, d} ◆
B) {a, b, c}
C) {a, b, c, d}
D) {a, c, d}

3) If $x \in B' = U - B$ then

A) $x \in B$ and $x \in U$
B) $x \notin B$ and $x \in U$ ◆
C) $x \notin B$ and $x \notin U$
D) $x \in B$ and $x \notin U$

4) Let A = (1, 2, 3, 4, 5 ….}, B = {2, 4, 6, 8 ….}

The $A \cup B$ is

A) {1, 2, 3}
B) {1, 2, 3, 4, 5, ….} ◆
C) {2, 4, 6, 8, ….}
D) {6, 7, 8, 9}

5) $L \cup M = L \cap M$ then L is equal to

A) M ◆
B) L
C) ϕ
D) M'

6) Which of the following sets has only one subset.

A) $\{Y, Z\}$
B) $\{Y\}$
C) $\{0\}$
D) $\{\ \}$ ◆

7) $A \subseteq B$ then

A) $A \cap B = A$ ◆
B) $A \cap B' = A$
C) $A - B = A$
D) $A - B = B$

8) If $x \in L - M$ then

A) $x \in L$ and $x \in M$
B) $x \in L$ and $x \notin M$ ◆
C) $x \notin L$ and $x \in M$
D) $x \notin L$ and $x \notin M$

9) Total number of subsets that can be formed from the set $\{x, y, z\}$ is

A) 1
B) 2
C) 5
D) 8 ◆

10) If $x \in L \cap M$ then

A) $x \in L$ and $x \in M$ ◆
B) $x \in L$ and $x \notin M$
C) $x \notin L$ and $x \in M$
D) $x \notin L$ and $x \notin M$

11) Let A and B be any non-empty sets then $A \cup (A \cap B)$ is

A) $B \cap A$
B) A ◆
C) B
D) $A \cup B$

12) Let A, B, C be any sets. Let $A \cup B = A \cup C$ and $A \cap B = A \cap C$, then B set is equal to
A) $A \cup B$
B) $A \cap B$
C) A
D) C ◆

13) If S contains n elements then power set of S, P (s) contains elements. Which are?
A) 2^n ◆
B) 4^n
C) 5^n
D) 6^n

14) A set is a collection of objects which are
A) well defined
B) well defined and distinct ◆
C) identical
D) not defined

15) The power set of a set S containing six numbers is the set whose elements are
A) three subsets of S
B) two subsets of S
C) five subsets of S
D) all possible subsets of S ◆

16) A is a subset of B if
A) Every element of $A \in B$ ◆

B) Some element of A $\in$ B
C) Every element of A $\notin$ B
D) Every element of B $\in$ A

17) The complement of set A relative to universal set U is the set
A) $\{x/x \in U \text{ and } x \in A\}$
B) $\{x/x \notin U \text{ and } x \notin A\}$
C) $\{x/x \notin U \text{ and } x \in A\}$
D) $\{x/x \in U \text{ and } x \notin A\}$ ◆

18) If A \ B = A then
A) $A \cap B = A$
B) $A \cap B = A'$
C) $A \cap B = B$
D) $A \cap B = \phi$ ◆

19) If B – A = B then
A) $A \cap B = \phi$ ◆
B) $A \cap B = A$
C) $A \cap B \neq \phi$
D) $A \cap B = B$

20) The union of the sets A and B is defined as
A) $A \cup B = \{x/x \in A \text{ or } x \in B\}$ ◆
B) $A \cup B = \{x/x \notin A \text{ or } x \in B\}$
C) $A \cup B = \{x/x \notin A \text{ or } x \notin B\}$
D) $A \cup B = \{x/x \in A \text{ or } x \notin B\}$

21) If Q, R are any sets then Q – R =
A) $Q - (Q \cap R)$ ◆
B) $Q \cap (Q - R)$
C) $Q + (Q \cap R)$
D) $Q - (Q \cup R)$

22) If A and B are any two sets and A′ B′ are Their compliments relative to the universal set U, the $(A\cup B)'$ =

A) $A'\cup B'$
B) $A\cup B$
C) $A'\cap B'$ ◆
D) $A\cap B$

23) Difference between two sets A\B is defined as

A) $\{x/x \in A \wedge x \in B\}$
B) $\{x/x \in A \wedge x \notin B\}$ ◆
C) $\{x/x \notin A \wedge x \in B\}$
D) $\{x/x \notin A \wedge x \notin B\}$

24) For union Associative Law is

A) $(A\cup B)\cup C = A\cup(B\cup C)$ ◆
B) $(A\cup B)\cup C = A\cap(B\cap C)$
C) $(A\cap B)\cup C = A\cup(B\cup C)$
D) $(A\cup B)\cup C = A - (B - C)$

25) The set of odd numbers between 1 and 9 is

A) {1, 3, 5, 7}
B) {3, 5, 7, 9}
C) {1, 3, 5, 7, 9} ◆
D) {3, 5, 7}

26) The set of rational numbers between 5 and 9 is

A) Finite
B) Infinite ◆
C) {5, 6, 7, 8, 9}
D) {6, 7, 8}

27) If x is a set having 6 elements then the numbers in P(x) is:

A) 6^2
B) 6
C) 6(2)
D) 2^6 ◆

28) If $B \subseteq A$ then A' is subset of

A) A
B) B
C) B' ◆
D) $A \cup B$

29) The set $A \cap (A \cup B) =$

A) A ◆
B) B
C) $A \cup B$
D) None of these

30) The set $A \cup (A \cap B) =$

A) B
B) A ◆
C) $A \cup B$
D) None of these

31) If A and B are any two sets and A', B' are their complements relative to the universal set U, then

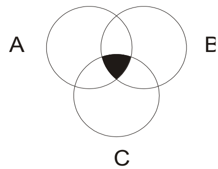
$(A \cap B)' =$

A) $A' \cup B'$ ◆
B) $A' \cap B'$
C) $A' \cup B$
D) $A \cap B'$

32) If $A \subseteq U$ then A' relative to U is equal to

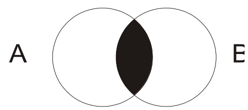
A) A – B
B) B – A
C) U – A ◆
D) A – U

33) The shaded area in the figure represents the set



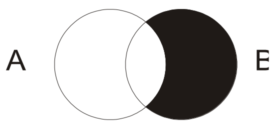
A) A∩E∩C ◆
B) A∪E∪C
C) A∪E∩C
D) A∩E∪C

34) The shaded area in the figure represents the set:



A) A∪E
B) A∩E ◆
C) A–E
D) E–A

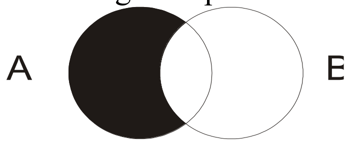
35) The shade area in the figure represents the set:



A) A∪E
B) A∩E
C) A–E

D) E–A ◆

36) The shaded area in the figure represents the set:



A) $A\cup E$
B) $A\cap E$
C) A–E ◆
D) E–A

37)Well defined collection of distinct objects is called a __________
A) a function
B) a set ◆
C) a real number
D) none

38) A diagram which represents a set is called ________ diagram.
A) Venn's ◆
B) Argand
C) Plane
D) None

39) If a set A is the subset of B & $A \neq B$, then A ________ of B.
A) Proper subset ◆
B) Improper subset
C) One
D) None

40) Every set is the _________ of itself.
A) proper subset
B) improper subset ◆
C) super set
D) none

41) The set of real Nos. (points) belonging to interval (a, b) is __________

A) finite set
B) empty set
C) singleton set
D) infinite set ◆

42) The power set of an empty set is _________

A) null set
B) singleton set ◆
C) super set
D) none

43) $X^{/}$ = ________

A) A
B) $A^{/}$
C) ∅ ◆
D) X

44) Two set A & B are called overlapping if A∩B = ________

A) $A \subseteq B,\ B \subseteq A$
B) $A \subseteq B$
C) $A \subseteq B,\ B \subseteq A$
D) None ◆

45) Which one is always true.

A) $A \subseteq B$ ◆
B) $A \cap B \subseteq B$
C) $B \subseteq A$
D) none

46) Every recurring non-terminating decimal represents

A) Q
B) $Q^{/}$
C) R ◆
D) none

47) If X & Y are two sets & n (X) = 18, n (Y) = 24, n(XUY) = 40
then n(X I Y) = ________
A) 3
B) 4
C) 6
D) 2 ◆

48) A real number is always
A) a natural no
B) positive integer
C) Rational number
D) complex number ◆

Groups

1) The set N of natural numbers is closed with respect to
A) Addition
B) Multiplication
C) Both A & B ◆
D) Subtraction

2) The set Z of integers is closed with respect to
A) Addition
B) Multiplication
C) Subtraction
D) A, B and C are correct ◆

3) The set R–{0} of real numbers is closed with respect to
A) Addition

B) Multiplication
C) Division
D) B & C are correct ◆

4) In the set S ={0,1} the binary operation defined is
A) −
B) +
C) × ◆
D) ÷

5) The set S ={-1,1,-i,i} is a group with respect to the binary operation
A) ÷
B) × ◆
C) +
D) −

6) The set S ={1, ω, ω^2} is a group with respect to the binary operation
A) × ◆
B) ÷
C) +
D) −

7) If set is a group with respect to addition then the number of identity elements in S is
A) Unique ◆
B) Two
C) Three
D) None

8) If set S is a group with respect to addition then each element of S has inverse.
A) Unique ◆

B) Two
C) Three
D) None

9) R–{0} is a group w.r.t the binary operation
A) +
B) × ◆
C) ÷
D) –

10) Q–{0} is a group w.r.t the binary operation
A) +
B) × ◆
C) ÷
D) –

11) R is a group w.r.t the binary operation.
A) + ◆
B) ×
C) ÷
D) –

12) Q is a group w.r.t the binary operation.
A) + ◆
B) ×
C) ÷
D) –

13) S = {1,-1} is a group w.r.t the binary operation.
A) +
B) × ◆
C) -
D) none of these

14) S ={0} is a trivial group under

A) + ◆

B) ×

C) ÷

D) –

15) S ={1} is trivial group under

A) +

B) × ◆

C) –

D) division

16) A non-empty set S which is closed with a binary operation ‘*’ is called group if

A) The binary operation is associative

B) There exists identity element with respect to the binary operation.

C) There exist a unique inverse of each element of S with respect to the binary operation.

D) All A, B & C hold. ◆

17) In a proposition if $p\to q$ then $q\to p$ is called

A) inverse of $p\to q$

B) converse of $p\to q$ ◆

C) contrapasitive $p\to q$

D) none

18) Truth table containing all false values is called

A) Tautology

B) Selfcontridiction ◆

C) Equivallent

D) None

19) Truth table containing all true values is called

A) Tautology ◆
B) Selfcontridiction
C) Equivallent
D) None

20) In a proposition if $p \rightarrow q$ then contrapasitive of this proposition is denoted by
   A) $q \rightarrow p$
   B) $\sim q \rightarrow p$
   C) $\sim q \rightarrow \sim p$ ◆
   D) None

21) In a proposition if $p \rightarrow q$ then inverse of this proposition is denoted by
   A) $q \rightarrow p$
   B) $\sim q \rightarrow p$
   C) $\sim p \rightarrow \sim q$ ◆
   D) None

22) In a proposition if $p \rightarrow q$ then converse of this proposition is denoted by
   A) $q \rightarrow p$ ◆
   B) $\sim q \rightarrow p$
   C) $\sim q \rightarrow \sim p$
   D) None

Unit 03: Theory of Quadratic Functions

1) An equation of the form $ax^2 + bx + c = 0$ is called

A) Quadratic ◆
B) Cubic
C) Bi-quadratic
D) Linear

2) In the quadratic equation $ax^2 + bx - c = 0$ the sum of roots is

A) $-b/c$
B) $-b/a$ ◆
C) $-c/a$
D) a/c

3) In the quadratic equation $ax^2 - bx + c = 0$ the product of roots is

A) c/a ◆
B) b/a
C) a/c
D) $-c/a$

4) The sum of cube roots of unity is

A) 3
B) 2
C) 1
D) 0 ◆

5) The roots of a quadratic equation $ax^2 + bx + c = 0$ are

A) $\dfrac{-b \pm \sqrt{b^2 + 4ac}}{2a}$

B) $\dfrac{+b \pm \sqrt{b^2 - 4ac}}{2a}$

C) $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2}$ ◆

D) $\dfrac{-b \pm \sqrt{b^2 + 4ac}}{2a}$

6) The product of cube root of unity is

A) 3
B) 2
C) 1 ◆
D) 0

7) The number of real roots in cube roots of unity are

A) 3
B) 2
C) 1 ◆
D) 0

8) The roots of quadratic equation $ax^2 - bx - c = 0$ are real if

A) $b^2 + 4ac \leq 0$
B) $b^2 - 4ac < 0$
C) $b^2 + 4ac \geq 0$
D) $b^2 - 4ac = 0$ ◆

9) The roots of quadratic equation $ax^2 + bx - c = 0$ are equal if

A) $b^2 - 4ac < 0$
B) $b^2 + 4ac \geq 0$
C) $b^2 + 4ac = 0$
D) $b^2 - 4ac = 0$ ◆

10) The roots of quadratic equation $ax^2 - bx - c = 0$ are imaginary if

A) $b^2 + 4ac < 0$ ◆
B) $b^2 - 4ac \geq 0$
C) $b^2 + 4ac = 0$
D) $b^2 - 4ac = 0$

11) If 4 & - 5 are the roots, then quadratic equation will be
A) $x^2 - x - 20 = 0$
B) $x^2 - x + 20 = 0$ ◆
C) $x^2 + x - 20 = 0$
D) $x^2 + x + 20 = 0$

12) The value of ω^{12} is
A) 1 ◆
B) ω
C) ω^2
D) 0

13) The square of a number when added to the number results in 6 then the number is
A) 2
B) – 2
C) –3
D) Both A & C ◆

14) The sum of roots of $3x^2 - 4x + 7 = 0$ is
A) 4/3 ◆
B) 7/3
C) –7/3
D) –4/3

15) The product of roots of $3x^2 + 5x - 2 = 0$ is
A) 5/3
B) 3/5

C) –2/5
D) –2/3 ◆

16) If $3^{1+x} + 5 \cdot 3^{x} - 8 = 0$, then $x =$
A) 8
B) 5
C) 3
D) 0 ◆

17) If $\sqrt{2x+1} + \sqrt{x} = 5$ then x =
A) 5
B) 4 ◆
C) 3
D) 2

18) If $\sqrt{5x-1} - \sqrt{2x} = 1$ then x =
A) 3
B) 2 ◆
C) 1
D) 5

19) If $\dfrac{\sqrt{2x+1} - \sqrt{x}}{\sqrt{2x+1} + \sqrt{x}} = \dfrac{1}{5}$, then x =
A) 1
B) 2
C) 3
D) 4 ◆

20) If one root of quadratic equation is $4 + 5i$, then equation
A) $x^2 - 8x + 41 = 0$ ◆
B) $x^2 + 8x + 41 = 0$
C) $x^2 - 41x + 8 = 0$
D) $x^2 - 41x - 8 = 0$

21) In the quadratic equation $x^2 - 9 = 0$, the sum of the root is

A) 9

B) –9

C) 1/9

D) 0 ◆

22) In the quadratic equation $3x^2 - 5x = 0$, the product of root is

A) 5/3

B) –5/3

C) 0 ◆

D) 3/5

23) The roots of quadratic equation $x^2 - 4x = 0$ are

A) Imaginary

B) Rational & Different ◆

C) Irrational

D) Rational & Equal

24) If ω, ω^2 are complex cube roots of unity

Then $\omega + \omega^2 =$

A) 1

B) –1 ◆

C) 0

D) none of these

25) If ω, ω^2 are complex cube roots of unity then $\omega^2 =$

A) $1/\omega$ ◆

B) $-\omega$

C) $-1/\omega$

D) none of these

26) $\left(\frac{-1+\sqrt{-3}}{2}\right)^4 + \left(\frac{-1-\sqrt{-3}}{2}\right)^4 =$

A) 0
B) 1
C) –1 ◆
D) 4

27) If ω and ω^2 are cube roots of unity then

$(1 - \omega - \omega^2)^5 =$

A) 0 ◆
B) 1
C) 32
D) None of these

28) If the area of a rectangle is 56 & the length is one more than the breadth then the dimensions are

A) –8, -7
B) 8, 7 ◆
C) 14, 4
D) 28, 2

29) The sides of a right angle triangle are $2x + 1$, $2x$, $2x – 1$, then x is

A) –1
B) ½
C) –2
D) 2 ◆

30) If one root of $4x^2 + 7hx – h^2 + 9 = 0$ is zero then h =

A) 0
B) 3
C) –3
D) ± 3 ◆

Unit 04: Matrices and Determinants

1) The order of the matrix [4 7 3] is

A) 3×1
B) 1×3 ◆
C) 3×3
D) 1×1

2) The value of determinant of the matrix $\begin{bmatrix} 1 & 3 & 5 \\ 7 & 9 & 11 \\ 13 & 15 & 17 \end{bmatrix}$ is

A) 0 ◆
B) 1
C) 2
D) 3

3) $\begin{bmatrix} 4 & 0 \\ 0 & 1 \end{bmatrix}$ is a ______ matrix.

A) singular
B) unit
C) diagonal ◆
D) scalar

4) If $\begin{bmatrix} 6 & \lambda \\ 3 & 2 \end{bmatrix}$ is singular matrix then $\lambda =$

A) 4 ◆
B) – 4
C) 12
D) 18

5) A, B, C are three matrices such that AB = C Then B =

A) $C^{-1}A$
B) CA
C) $A^{-1}C$ ◆
D) AC
E)

6) Value of the determinant of matrix $\begin{bmatrix} a & 0 & b \\ c & 0 & -d \\ e & 0 & f \end{bmatrix}$ is

A) 1
B) 2
C) 0 ◆
D) 3

7) Value of determinant of the matrix $\begin{bmatrix} a & b+c & 1 \\ b & c+a & 1 \\ c & a+b & 1 \end{bmatrix}$ is

A) c
B) b
C) a
D) 0 ◆

8) If B is square matrix and B^t=- B, then B is called

A) Symmetric
B) Skew symmetric ◆
C) Singular
D) Non-singular

9) For any two non singular square matrices A and B, $(AB)^{-1}$ =

A) AB
B) $B^{-1}A^{-1}$ ◆

C) $A^{-1}B^{-1}$
D) $A^{-1}B$

10) If $A = \begin{bmatrix} 1 & 2 \\ 3 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 6 \\ 5 \end{bmatrix}$ then we can find
A) A + B
B) A – B
C) AB ◆
D) BA

11) If A is non singular square matrix then $A^{-1} =$
A) $\frac{1}{A}$
B) $\frac{1}{|A|}$
C) $\frac{adjA}{|A|}$ ◆
D) $\frac{1}{adjA}$

12) If A is matrix of order $m \times n$ then kA is of order (k is real number)
A) $km \times n$
B) $m \times kn$
C) $km \times kn$ ◆
D) $m \times n$

13) The value of determinant of the matrix $\begin{bmatrix} 1 & \cos^2\alpha & \sin^2\alpha \\ 1 & \cos^2\beta & \sin^2\beta \\ 1 & \cos^2\chi & \sin^2\chi \end{bmatrix}$ is

A) 1
B) 0 ◆
C) 2
D) – 1

14) The value of determinant of the matrix $\begin{bmatrix} \cos 2\alpha & \cos^2\alpha & \sin^2\alpha \\ \cos 2\beta & \cos^2\beta & \sin^2\beta \\ \cos 2\chi & \cos^2\chi & \sin^2\chi \end{bmatrix}$ is

A) 1
B) 2
C) 0 ◆
D) – 1

15) The value of determinant of the matrix $\begin{bmatrix} a^2-b^2 & b^2-c^2 & a^2-c^2 \\ b^2-c^2 & c^2-a^2 & b^2-a^2 \\ c^2-a^2 & a^2-b^2 & c^2-b^2 \end{bmatrix}$ is

A) 0 ◆
B) 1
C) 2
D) 3

16) If $B = \begin{bmatrix} 3 & 5 & 4 \\ 4 & 4 & 6 \\ 1 & 2 & 3 \end{bmatrix}$ then – B is

A) $\begin{bmatrix} -3 & -5 & -4 \\ -4 & -4 & -6 \\ -1 & -2 & -3 \end{bmatrix}$ ◆

B) $\begin{bmatrix} -3 & 5 & 4 \\ -4 & 4 & 6 \\ -1 & 2 & 3 \end{bmatrix}$

C) $\begin{bmatrix} 3 & -5 & 4 \\ 4 & -4 & 6 \\ 1 & -2 & 3 \end{bmatrix}$

D) $\begin{bmatrix} 3 & 5 & -4 \\ 4 & 4 & -6 \\ 1 & 2 & -3 \end{bmatrix}$

17) If $A = \begin{bmatrix} 3 & 2 & 1 \\ 6 & 5 & 4 \\ 7 & 6 & 4 \end{bmatrix}$ then 2A is

A) $\begin{bmatrix} 6 & 4 & 2 \\ 6 & 5 & 4 \\ 7 & 6 & 4 \end{bmatrix}$

B) $\begin{bmatrix} 3 & 2 & 1 \\ 12 & 10 & 8 \\ 7 & 6 & 4 \end{bmatrix}$

C) $\begin{bmatrix} 3 & 2 & 1 \\ 6 & 5 & 4 \\ 14 & 12 & 8 \end{bmatrix}$

D) $\begin{bmatrix} 6 & 4 & 2 \\ 12 & 10 & 8 \\ 14 & 12 & 8 \end{bmatrix}$ ◆

Unit 05: Partial Fractions

An open formed by using the sign of equality "=" is called _______

a) Equation ◆
b) In – equation
c) True sentence
d) False sentence

2. 2x = 3 is a conditional equation it is true for _______

a) 2
b) 3
c) $\frac{3}{2}$ ◆
d) $\frac{2}{3}$

3. $x^2 + x - 6 = 0$ is a conditional equation and it is true for

a) 2, 3
b) 2, - 3 ◆
c) – 2, - 3
d) – 2, 3

4. The symbol _________ shall be used both for equation and identity

a) $\cong$
b) = ◆
c) $\neq$
d) $\equiv$

5. $\frac{P(x)}{Q(x)}$, $Q(x) \neq 0$ is known as

a) improper rational fraction
b) rational fraction ◆
c) proper rational fraction
d) none of the above

6. $\dfrac{9x^2}{x^{3-1}}$ is a fraction.

a) rational fraction ◆
b) improper fraction
c) rational fraction
d) none of these

7. $\dfrac{x^2-3}{3x+1}$ is a fraction

a) rational fraction
b) proper fraction
c) improper rational fraction ◆
d) none of these

8. There are -------_types of rational fraction.

a) Three ◆
b) four
c) five
d) two

9. The partial fraction of $\dfrac{1}{x^2-1}$ is

a) $\dfrac{1}{2(x-1)}-\dfrac{1}{2(x+1)}$ ◆
b) $\dfrac{1}{2(x-1)}$

c) $\dfrac{1}{2(x+1)}$

d) $\dfrac{1}{2(x-1)}+\dfrac{1}{2(x+1)}$

10. The partial fraction of $\dfrac{2x^2-3x+4}{(x-1)^3}$ is

a) $\dfrac{2}{x-1}$

b) $\dfrac{1}{(x-1)^2}$

c) $\dfrac{2}{x-1}+\dfrac{1}{(x-1)^2}+\dfrac{3}{(x-1)^3}$ ◆

d) $\dfrac{3}{(x-1)^3}$

11. The partial fraction of $\dfrac{9x-7}{(x^2+1)(x+3)}$ is

a) $\dfrac{17x-6}{5(x^2+1)}$

b) $\dfrac{17x-6}{5(x^2+1)}-\dfrac{17}{5(x+3)}$ ◆

c) $\dfrac{17}{5(x+3)}$

d) none of these

12. The partial fraction of $\dfrac{x^3+2x+2}{(x^2+x+1)^2}$ is

a) $\dfrac{x-1}{x^2+x+1}$

b) $\dfrac{2x+3}{(x^2+x+1)^2}$

c) $\dfrac{2x+3}{(x^2+x+1)^2}-\dfrac{x-1}{x^2+x+1}$

d) $\dfrac{x-1}{x^2+x+1}+\dfrac{2x+3}{(x^2+x+1)^2}$ ◆

Unit 06: Sequences and Series

1) The general term of the sequence 2/1, 3/2, 4/3, … is an

A) $\dfrac{n+1}{n}$ ◆

B) $\dfrac{n}{n+1}$

C) $\dfrac{n}{n-1}$

D) $\dfrac{n-1}{n}$

2) If a, a+d, a+2d, …… is A.P, then an =

A) a + nd
B) a – nd
C) a + (n – 1)d ◆
D) a + (n + 1)d

3) $\dfrac{a^{n+1}+b^{n+1}}{a^n+b^n}$ is arithmetic mean between a and b if n =

A) –1
B) 1
C) 0 ◆
D) 2

4) If A,. G, H are A.M, G.M, and H.M between two numbers, then

A) A < G < H
B) A < G > H
C) A > G > H ◆
D) A > G < H

5) The harmonic mean between two numbers a and b is

A) $\pm\sqrt{ab}$

B) $\dfrac{a+b}{2}$

C) $\dfrac{2ab}{a+b}$ ◆

D) $\dfrac{2ab}{a-b}$

6) The arithmetic mean between 4 and 6 is

A) $\sqrt{24}$

B) $-\sqrt{24}$

C) 24/5

D) 5 ◆

7) If a is the first term and r < 1 is common ratio of G.P, then Sn =

A) $\dfrac{a(1-r^n)}{1-r}$ ◆

B) $\dfrac{a(1+r^n)}{1+r}$

C) ar^n

D) $\dfrac{a(1-r^n)}{1+r}$

8) An infinite geometric series is convergent if

A) $|r|<1$ ◆

B) r > 1

C) r = 1

D) Both B and C are correct

9) If a is the first term and r is the common ration of G.P then an =

A) ar^{n-1} ◆

B) ar^{n+1}

C) $\frac{a(1-r^n)}{1-r}$

D) $\frac{a(1+r^n)}{1+r}$

10) $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ is H.M between a and b if

A) n = 0

B) n = 1

C) n = -1 ◆

D) n = 2

11) If a is the first term and r is common ratio such that r < 1, then S_∞ =

A) $\frac{a}{1-r}$ ◆

B) $\frac{a}{1+r}$

C) $\frac{a(1-r^n)}{1-r}$

D) $\frac{a(1+r^n)}{1+r}$

12) The harmonic mean between 9 and 11 is

A) 10

B) $\pm\sqrt{99}$

C) $-\sqrt{99}$

D) 99/10 ◆

13) If A, G, H are arithmetic mean, geometric and harmonic mean between a and b, then

A) $G^2 = AH$ ◆
B) $A^2 = GH$
C) $H^2 = AG$
D) None of these

14) -1, 1, -1, 1, …. is

A) Arithmetic Sequence
B) Geometric Sequence ◆
C) Alternating Sequence
D) Harmonic Sequence

15) The geometric mean between 8/9, 9/8 is

A) $+1$ ◆
B) -1
C) ± 1
D) $\frac{8}{17}$

16) A sequence is a function whose domain is

A) the set of rational numbers
B) The set of irrational numbers
C) The set of integers
D) The set of natural numbers ◆

17) The geometric mean between a and b is

A) $\frac{a+b}{2}$
B) $\sqrt{ab}$ ◆
C) $\frac{2ab}{a+b}$

D) $\frac{a+b}{2ab}$

18) The arithmetic mean between a and b is

A) $\frac{2ab}{a+b}$

B) $\frac{a+b}{2ab}$

C) $\frac{a+b}{2}$ ◆

D) $\pm\sqrt{ab}$

19) Which of the following series is convergent.

A) 2 – 6 + 18 - ……

B) 8 + 4 + 2 + ……. ◆

C) 5 + 10 + 20 + …….

D) 3/2 + 3 + 6 + ……..

20) If a = 3, r = 2/3, then sum of infinite S_∞ =

A) 9 ◆

B) $\frac{9}{2}$

C) $\frac{2}{9}$

D) $\frac{3}{2}$

21) If 2 + 1 + ½ + ….. is infinite geometric series then S_∞

A) 2

B) 4 ◆

C) ½

D) ¼

22) The population of a town increases geometrically at the rate of 4% per year. If the present population is 100,000, then population after 4 years will be

A) $100{,}000\,(1 + .04)^3$
B) $100{,}000\,(1 + .04)^4$ ◆
C) $100{,}000\,(1 - 0.04)^3$
D) $100{,}000\,(1 - 0.04)^4$

23) The sum of n terms of arithmetic series S_n =

A) $n/2[2a + (n - 1)d]$ ◆
B) ar^{n-1}
C) $\dfrac{a(1-r^n)}{1-r}$
D) $a + (n - 1)d$

24) The two arithmetic means between 5 and 35 are

A) 15, 25 ◆
B) 10, 20
C) 10, 15
D) 10, 25

25) If 2b – 1, 4b + 1, 15b – 3 is a geometric series, then b =

A) 4
B) 3
C) 2 ◆
D) 1

26) Which of the following is a geometric series?

A) 5, 7, 9, 11, …..
B) 3, 5, 7, 9…….
C) 1, 1/3, 3, 9, …..

D) 9, 3, 1, 1/3, …… ◆

27) The general term of the sequence 3, 6, 9, 12 ….. is

A) n
B) 2n
C) 3n ◆
D) n^2

28) Which of the following is harmonic sequence?

A) 3, 5, 7 ……
B) ½, ¼, 1/8, …..
C) ½, 1/3, ¼ …… ◆
D) 3, 9, 27 …..

Unit 07: Permutations and Combinations

1) If n is a positive integer then n! =

A) n (n + 1) (n + 2) …… (n + n)
B) n (n – 1) (n – 2) …. 3.2.1 ◆
C) $\frac{n(n+1)}{2}$
D) $\frac{n(n-1)}{2}$

2) If $^{n}P_{2} = 20$ then n =

A) 4
B) 5 ◆
C) 6
D) 10

3) $^{n}C_{r} =$

A) $\frac{n!}{(n-r)!}$
B) $\frac{n!}{(n-r)!r!}$ ◆
C) $\frac{n!}{r!}$
D) $\frac{r!}{(n-r)!}$

4) ${}^{n}P_{r} =$

A) $\dfrac{n!}{r!}$

B) $\dfrac{r!}{(n-r)!}$

C) $\dfrac{n!}{(n-r)!}$ ◆

D) $\dfrac{n!}{(n-r)!r!}$

5) ${}^{n}P_{o} =$

A) n!
B) n
C) 1 ◆
D) 0

6) ${}^{10}P_{2} =$

A) 90 ◆
B) 10
C) 8
D) 80

7) If ${}^{n}C_{6} = {}^{n}C_{10}$ then n =

A) 4
B) 6
C) 10 ◆
D) 16

8) The number of words which can be formed out of the word "ASSASSINATION", when all the letters are used in each word are

A) $\begin{pmatrix} 13 \\ 4,3,2,2,1,1 \end{pmatrix}$ ◆

B) 13!

C) $\dfrac{4!}{13!}$

D) $\dfrac{13}{4!}$

9) The numbers of diagonals in ten sided figure is

A) 10

B) ${}^{10}C_2$

C) ${}^{10}C_2 - 10$

D) 35 ◆

10) The number of ways a hockey eleven can be selected out of 15 players if it includes a particular player.

A) ${}^{15}C_{11}$

B) ${}^{14}C_{11}$

C) ${}^{14}C_{10}$ ◆

D) ${}^{15}C_{10}$

11) ${}^{5}P_0 =$

A) 5

B) 0

C) 15

D) 1 ◆

12) The number of possible permutations of the letters of the word, "ADDING" having two D'S together.

A) 5! ◆

B) 3!

C) 4!
D) 25

13) For any event A
A) $0 \leq P(A) \leq 1$ ◆
B) $-1 \leq P(A) \leq 1$
C) $-2 \leq P(A) \leq 2$
D) $0 \leq P(A) \leq 2$

14) The number of words that can be formed from the letters of the word, "PAKPATTAN" are

A) 9!
B) ${}^9C_7$
C) ${}^9P_7$
D) $\frac{9!}{3!2!2!}$ ◆

15) The number of words that can be formed from the letters of the word, "COMMITTEE" are

A) ${}^9P_9$
B) ${}^9C_9$
C) $\frac{9!}{2!2!2!}$ ◆
D) 9

16) The events A & B are said to be disjoint if $A \cap B$ is
A) ϕ ◆
B) A
C) B
D) $A \cup B$

17)A dice is thrown then the probability to get an even number is

A) 4/5
B) 3/5
C) 2/3
D) ½ ◆

18) A slip is picked out of 8 slips numbered from 1 to 8 then the probability to get number 4 is

A) 8
B) 1/8 ◆
C) ½
D) 3/8

19 The three digit numbers that can be formed from 0, 1, 2, 3, 4, when no digit is repeated are

A) 48 ◆
B) 36
C) 24
D) 10

20 The number of distinct permutations from the letters of the word, "ARTICLE" using all the letters are

A) 7
B) 7! ◆
C) 49
D) 59

21 Teams A & B are playing football match. The probability that A will win is 4/13 that of B is 5/13. The probability that the match will end in a draw is

A) 5/13
B) 4/13 ◆
C) 9/13

D) 3/13

22 A & B are mutually exclusive events the $P(A \cup B) =$

A) $P(A) \cup P(B)$
B) $P(A) + P(B)$ ◆
C) $P(A) + P(B) - P(A \cap B)$
D) $P(A) - P(B)$

23 If $A \subset S$ then $P(A') =$

A) $1 + P(A)$
B) $1 - P(A)$ ◆
C) $\dfrac{1}{P(A)}$
D) $P(A)$

24 The probability that Aslam was not born in a month which begins with the letter "J" is ¾ , then the probability that he was born in January, June, July is

A) 5/4
B) ¾
C) ¼ ◆
D) 7/4

25 A bag contains 30 balls, some of which are red and the remaining are blue. The probability of drawing red is 1/6, then the number of blue balls are

A) 25 ◆
B) 20
C) 48
D) 16

26 The number of diagonals in 8 – sided figure is

A) 64

B) 20
C) 48
D) 16

Unit 08: Mathematical Induction and Binomial Theorem

1 1 + 2 + 3 …….+ n =

A) $\dfrac{n^2(n+1)^2}{4}$

B) $\dfrac{n(n+1)}{2}$ ◆

C) $\dfrac{n(n+1)(2n+1)}{6}$

D) $\dfrac{n^2}{2}$

2 The number of terms in the expansion of $(2x + y)^6$ are

A) 6

B) 7 ◆

C) 8

D) 14

3 $1^2 + 2^2 + 3^2 + \ldots\ldots n^2 =$

A) $\dfrac{n(n+1)}{2}$

B) $\dfrac{n(n+1)(2n+1)}{6}$ ◆

C) $\dfrac{n^2(n+1)^2}{4}$

D) $\frac{n^2}{2}$

4 $1^3 + 2^3 + 3^3 + \ldots.. n^3 =$

A) $\frac{n^2}{2}$

B) $\frac{n(n+1)(2n+1)}{6}$

C) $\frac{n(n+1)}{2}$

D) $\frac{n^2(n+1)^2}{4}$ ◆

5 If x is so small that its square and higher powers be neglected then $(1 + 3x)^{-2} =$

A) $1 + 9x$
B) $1 - 9x$
C) $1 + 6x$
D) $1 - 6x$ ◆

6 For every positive integer n
$1 + 5 + 9 + \ldots\ldots.. + (4n - 3)$ is equal to

A) $n(2n - 1)$ ◆
B) $(2n - 1)$
D) $n - 1$
D) n

7 When we expand $(a + 2b)^2$ then

A) $a^5 + 10a^4b + 40a^3b^2 + 80a^2b^3 + 80ab^4 + 32b^5$ ◆
B) $a^5 + a^4b + a^3b^2 + a^2b^3 + ab^4 + b^5$
C) $5a^5 + 4a^4b + 3a^3b^2 + 2a^2b^3$

+ $1ab^4 + b^5$

D) None of above

8 The term involving x^4 in the expansion of $(3 – 2x)^7$ is

A) 120

B) 1512

C) 1250

D) 15120 ◆

9 if $1 + \frac{1}{4} + \frac{1.3}{4.8} + \frac{1.3.5}{4.8.12} + \ldots\ldots\ldots +R$ is

A) $\sqrt{2}$

B) $\sqrt{3}$ ◆

C) $\sqrt{5}$

D) $\sqrt{7}$

10 For each natural number n.

$1 + 3 + 5 + \ldots + (2n – 1) = \ldots\ldots\ldots\ldots$

A) n^2 ◆

B) n

C) n^3

D) n^4

11 $(a + x)^n = \sum_{r=0}^{n} \binom{n}{r} a^{n-r}$ where a and x are:

A) imaginary

B) Rational

C) Irrational

D) Real numbers ◆

12 Number of terms in the expansion of

$(a + x)^n$ is

A) n – 1

B) n + 1 ◆

C) n + 2

D) n + 3

13 The expansion of $(1 - \frac{5}{8}x)$ is valid

when:

A) $x < \frac{8}{5}$

B) $x < \frac{5}{8}$

C) $|x| < \frac{8}{5}$ ◆

D) $|x| > \frac{8}{5}$

14 ${}^nC_2$ = exists when n is ……..

A) $n > 2$

B) $n \leq 2$

C) $n < 2$

D) $n \geq 2$ ◆

15 1st four terms of the expansion

$(1 – x)^{-2}$ are

A) $1 + 2x + 3x^2 + 4x^3$ ◆

B) $3x^2 + 2x + 1$

C) $1 + 3x + 4x^2 + 5x^3$

D) None of these

16 The expansion $(1 + x)^{-3}$ holds when

A) $|x| > 1$

B) $|x| < 1$ ◆

C) $|x| > 1$

D) $x < 1$

17 The middle term of the expansion

$(1 + 2x)^6$ is ………….

A) 1^{st} term

B) 4^{th} term ◆

C) 2^{nd} term

D) 3^{rd} term

18 If n is add the expansion $(a + x)^n$ has ………….. middle terms.

A) 2 ◆

B) 3

C) 4

D) 5

19 The general term of expansion

$(a + x)^n$ is:

A) a^{n-r}

B) $\binom{n}{r}$

C) $\binom{n}{r} a^{n-r} x^r$ ◆

D) None of above

Unit 09: Division of Polynomials

1. What is the degree of the polynomial $3x^3 + 2x^2 - 5x + 4$?
   A) 2
   B) 3 *
   C) 4
   D) 1
2. In the polynomial $a_nx^n + a_{n-1}x^{n-1} + \ldots + a_0$, what condition must the exponent n satisfy?
   A) It must be a positive integer.
   B) It must be a real number.
   C) It must be a non-negative integer. *
   D) It must be greater than 1.
3. When a polynomial $f(x)$ is divided by $x - a$, the remainder is:
   A) $q(a)$
   B) $f(0)$
   C) $f(a)$ *
   D) a
4. According to the Remainder Theorem, if $f(x)$ is divided by $x + 1$, the remainder is:
   A) $f(1)$
   B) $f(-1)$ *
   C) $f(0)$
   D) Cannot be determined
5. The Factor Theorem states that $x - a$ is a factor of $f(x)$ if and only if:
   A) $f(a) = 1$
   B) $f(a) = f(-a)$

C) $f(0) = a$

D) $f(a) = 0$ *

6. Which of the following is a factor of the polynomial $x^2 - 1$?

A) $x - 2$

B) $x + 2$

C) $x + 1$ *

D) x

7. In synthetic division, what is the first step?

A) Write the value of a to the left.

B) Add the terms in the first column.

C) Write the coefficients of the dividend in decreasing order of powers. *

D) Multiply the leading coefficient by a.

8. What is the purpose of inserting 0 in the coefficient line during synthetic division?

A) To make the division easier.

B) To represent a missing term in the polynomial. *

C) To indicate the end of the polynomial.

D) It is a random placeholder.

9. For a polynomial $px^3 + qx^2 + cx + d$ divided by $x - a$ using synthetic division, how is the first coefficient of the quotient obtained?

A) By multiplying p and a

B) By adding p and a

C) By bringing down p directly *

D) By subtracting a from p

10. What is the quotient when $x^3 - 7x + 6$ is divided by $x - 2$?

A) $x^2 + 2x - 3$ *

B) $x^2 - 2x - 3$

C) $x^2 + 2x + 3$

D) $x^2 - 2x + 3$

11. If a polynomial $f(x)$ is divided by $x - a$ and the remainder is 0, what can we conclude?

A) $x + a$ is a factor.

B) $f(0) = a$.
C) $x = a$ is not a root of $f(x) = 0$.
D) $x - a$ is a factor of $f(x)$. *

12. In signal processing, the poles of a system are found by determining the roots of which part of the transfer function $H(z) = B(z)/A(z)$?
A) The numerator, $B(z)$
B) The denominator, $A(z)$ *
C) The sum $B(z) + A(z)$
D) The difference $B(z) - A(z)$

13. For a digital signal processing system to be stable, where must all its poles lie?
A) Outside the unit circle $(|p_0| > 1)$
B) On the unit circle $(|p_0| = 1)$
C) Inside the unit circle $(|p_0| < 1)$ *
D) At the origin $(p_0 = 0)$

14. The zeros of a system in signal processing are found by determining the roots of:
A) The denominator polynomial, $A(z)$
B) The transfer function $H(z)$
C) The numerator polynomial, $B(z)$ *
D) The constant term of $A(z)$

15. In polynomial regression, if a data point is missing, which theorem can be used to find its predicted value?
A) Factor Theorem
B) Remainder Theorem *
C) Binomial Theorem
D) Pythagorean Theorem

16. A polynomial regression model $P(x) = x^3 + x^2 + 2x + 1$ predicts sales. What is the predicted value for month 3 (x=3)?
A) 40
B) 43 *

C) 27
D) 9

17. Using the Factor Theorem, what is the other factor of $x^2 - 9$ after factoring out $(x-3)$?
A) $(x+3)$ *
B) $(x-3)$
C) $(x+9)$
D) $(x-9)$

18. If a system's transfer function has a denominator $A(z) = z^2 - 0.25$, what are its poles?
A) $z = 0.25$ and $z = -0.25$
B) $z = 0.5$ and $z = -0.5$ *
C) $z = \pm 0.25i$
D) $z = 0$

19. If a system has poles at $z = 2$ and $z = -0.5$, what can be said about its stability?
A) Stable, because one pole is inside the unit circle.
B) Unstable, because the pole at $z = 2$ is outside the unit circle. *
C) Stable, because all poles are real.
D) Unstable, because the pole at $z = -0.5$ is negative.

20. When dividing a polynomial $f(x)$ by a linear polynomial $x - a$ using synthetic division, the last number in the bottom row represents:
A) The first coefficient of the quotient.
B) The quotient.
C) The degree of the polynomial.
D) The remainder. *

21. If $x + 1$ is a factor of $f(x) = x^3 + px^2 + qx + 2$, what is the value of $f(-1)$?
A) 1
B) -1
C) 2
D) 0 *

22. In the division of polynomials, the relationship between dividend $P(x)$, divisor $D(x)$, quotient $Q(x)$, and remainder R is:
A) $P(x) = D(x)/Q(x) + R$
B) $P(x) = D(x) \times Q(x) + R$ *
C) $P(x) = D(x) + Q(x) + R$
D) $P(x) = D(x) \times R + Q(x)$

23. What is the degree of the quotient when a polynomial of degree 4 is divided by a polynomial of degree 2?
A) 4
B) 3
C) 2 *
D) 1

24. For the polynomial $x^3 - 7x + 6$, what is $f(2)$?
A) 8
B) -8
C) 0 *
D) 6

25. The remainder when $f(x) = x^4 + x^3 + 2$ is divided by $x + 2$ is:
A) 16
B) -16 *
C) 2
D) 0

Unit 10: Trigonometric Identities

1. Distance r of the point $P(x_1, y_1)$ from the origin is given by the relation r = ______ ?
   a) $x_1^2 + y_1^2$
   b) $\sqrt{x_1^2 + y_1^2}$ ◆
   c) $\sqrt{x_1^2 + y_1^2 + 2x_1y_1}$
   d) $\sqrt{x_1^2}$

2. If $\text{Sin}\,\theta_1 = \text{Sin}\,\theta_2$ and $\text{Cos}\,\theta_1 = \text{Cos}\,\theta_2$ then
   a) $\sin\frac{1}{2}(\theta_1 + \theta_2) = 0$
   b) $\sin\frac{1}{2}(\theta_1 - \theta_2) = 0$ ◆
   c) $\cos\frac{1}{2}(\theta_1 + \theta_2) = 0$
   d) $\cos\frac{1}{2}(\theta_2 - \theta_1) = -1$

3. Distance r of the point P(1, 2) from the origin O(0, 0) is given by the relation r = ___ ?
   a) 5 ◆
   b) $\sqrt{5}$
   c) 25
   d) $\sqrt{3}$

4. $\cos(\alpha - \beta) =$

a) $\cos\alpha\cos\beta - \sin\alpha\sin\beta$ ◆
b) $\cos\alpha\cos\beta + \sin\alpha\sin\beta$
c) $\sin\alpha\cos\beta - \cos\alpha\sin\beta$
d) $\sin\alpha\cos\beta + \cos\alpha\sin\beta$

5. $\cos(\alpha + \beta) =$
   a) $\cos\alpha\cos\beta - \sin\alpha\sin\beta$ ◆
   b) $\cos\alpha\cos\beta + \sin\alpha\sin\beta$
   c) $\sin\alpha\cos\beta - \cos\alpha\sin\beta$
   d) $\sin\alpha\cos\beta + \cos\alpha\sin\beta$
   e) $\sin\alpha\sin\beta - \cos\alpha\cos\beta$

6. $\sin(\alpha - \beta) =$
   a) $\cos\alpha\cos\beta - \sin\alpha\sin\beta$ ◆
   b) $\cos\alpha\cos\beta + \sin\alpha\sin\beta$
   c) $\sin\alpha\cos\beta - \cos\alpha\sin\beta$
   d) $\sin\alpha\cos\beta + \cos\alpha\sin\beta$

7. $\sin(\alpha + \beta) =$
   a) $\cos\alpha\cos\beta - \sin\alpha\sin\beta$ ◆
   b) $\cos\alpha\cos\beta + \sin\alpha\sin\beta$
   c) $\sin\alpha\cos\beta - \cos\alpha\sin\beta$
   d) $\sin\alpha\cos\beta + \cos\alpha\sin\beta$

8. $\cos(-\alpha) =$
   a) $\sec\alpha$
   b) $-\sin\alpha$
   c) $\sin\alpha$
   d) $\cos\alpha$ ◆

9. $\sin(-\alpha) =$

a) $\sec\alpha$
b) $-\sin\alpha$ ◆
c) $\sin\alpha$
d) $-\cos\alpha$

10. $\cot(-\alpha) =$

a) - $\tan\alpha$
b) $\tan\alpha$
c) $\cot\alpha$
d) $-\cot\alpha$. ◆

11. $\tan(-\alpha) =$

a) - $\tan\alpha$ ◆
b) $\tan\alpha$
c) $\cot\alpha$
d) $-\cot\alpha$

12. $\sec(-\alpha) =$

a) $-\cos\alpha$
b) - $\sec\alpha$
c) $\sec\alpha$ ◆
d) $\operatorname{cosec}\alpha$

13. $\cos(90^\circ - \alpha) =$

a) $-\cos\alpha$
b) $\cos\alpha$
c) $-\sin\alpha$
d) $\sin\alpha$ ◆

14. $\sin(90^\circ - \alpha) =$

a) $\tan\alpha$

b) $\cos\alpha$ ◆
c) $-\sin\alpha$
d) $\sin\alpha$

15. $\tan(90^\circ - \alpha) =$
a) $\tan\alpha$
b) $-\tan\alpha$
c) $-\sin\alpha$
d) $\cot\alpha$ ◆

16. $\cot(90^\circ - \alpha) =$
a) $\tan\alpha$ ◆
b) $-\tan\alpha$
c) $-\sin\alpha$
d) $-\cot\alpha$

17. $\sec(90^\circ - \alpha) =$
a) $-\text{cosec}\,\alpha$
b) $\text{cosec}\,\alpha$ ◆
c) $-\sec\alpha$
d) $\sec\alpha$

18. $\cos(\alpha - 90^\circ) =$
a) $-\text{cosec}\,\alpha$
b) $\text{cosec}\,\alpha$
c) $-\sec\alpha$
d) $\sin\alpha$ ◆

19. $\cos ec(90^\circ - \alpha) =$
a) $-\text{cosec}\,\alpha$
b) $\text{cosec}\,\alpha$
c) $-\sec\ \alpha$

d) $\cot\alpha$ ◆

20. $\sec(\alpha - 90^{\circ}) =$

a) $\text{cosec}\,\alpha$ ◆

b) $-\sec\alpha$

c) $-\cot\alpha$

d) $\cot\alpha$

21. $\sin(\alpha - 90^{\circ}) =$

a) $-\cos\alpha$ ◆

b) $\text{cosec}\,\alpha$

c) $-\sec\alpha$

d) $\sin\alpha$

22. $\tan(\alpha - 90^{\circ}) =$

a) $\tan\alpha$

b) $-\tan\alpha$

c) $-\cot\alpha$ ◆

d) $\cot\alpha$

23. $\cos ec(\alpha - 90^{\circ}) =$

a) $\text{cosec}\,\alpha$

b) $-\sec\alpha$ ◆

c) $-\cot\alpha$

d) $\cot\alpha$

e) $\cos\alpha$

24. $\cos\left(\frac{\pi}{2} - \alpha\right) =$

a) $\text{cosec}\,\alpha$

b) $\cos\alpha$

c) $-\cos\alpha$

d) $\sin\alpha$ ◆

25. $\sin\left(\frac{\pi}{2}-\alpha\right)=$

a) $\operatorname{cosec}\alpha$
b) $\cos\alpha$ ◆
c) - $\cos\alpha$
d) $-\sin\alpha$

26. $\cot\left(\frac{\pi}{2}-\alpha\right)=$

a) $\cot\alpha$
b) $\tan\alpha$ ◆
c) $-\cos\alpha$
d) $-\sin\alpha$

27. $\tan\left(\frac{\pi}{2}-\alpha\right)=$

a) $\cot\alpha$ ◆
b) $\tan\alpha$
c) $-\cos\alpha$
d) $-\sin\alpha$
e) $\sin\alpha$

28. $\cos\left(\alpha-\frac{\pi}{2}\right)=$

a) $\sec\alpha$
b) $-\cos\alpha$
c) $\cos\alpha$
d) $\sin\alpha$ ◆

29. $\sin\left(\alpha-\frac{\pi}{2}\right)=$

a) $\sec\alpha$
b) $-\cos\alpha$ ◆
c) $\cos\alpha$
d) $-\sin\alpha$

30. $\tan\left(\alpha-\frac{\pi}{2}\right)=$

a) $\sec\alpha$
b) $\cot\alpha$
c) $-\cot\alpha$ ◆
d) $\tan\alpha$

31. $\sec\left(\alpha-\frac{\pi}{2}\right)=$

a) $\sec\alpha$
b) $\cot\alpha$
c) $\mathrm{cosec}\,\alpha$
d) $-\tan\alpha$ ◆

32. $\cos ec\left(\alpha-\frac{\pi}{2}\right)=$

a) $\sec\alpha$
b) $-\sec\alpha$ ◆
c) $\mathrm{cosec}\,\alpha$
d) $\tan\alpha$

33. $\cos(\alpha+90^\circ)=$

a) $-\sin\alpha$ ◆
b) $\sin\alpha$
c) $\cos\alpha$

d) $-\cos\alpha$

34. $\sin(\alpha+90^{\circ})=$

a) $-\sin\alpha$
b) $\sin\alpha$ ◆
c) $\cos\alpha$
d) $-\cos\alpha$

35. $\cot(\alpha+90^{\circ})=$

a) $-\sin\alpha$
b) $-\cot\alpha$
c) $\cot\alpha$
d) $-\tan\alpha$ ◆

36. $\csc(\alpha+90^{\circ})=$

a) $-\sin\alpha$
b) $-\csc\alpha$
c) $-\sec\alpha$
d) $\sec\alpha$ ◆

37. $\cos\left(\frac{\pi}{2}+\alpha\right)=$

a) $-\sin\alpha$ ◆
b) $-\csc\alpha$
c) $-\sec\alpha$
d) $\csc\alpha$

38. $\sin\left(\frac{\pi}{2}+\alpha\right)=$

a) $-\sin\alpha$
b) $-\csc\alpha$
c) $-\sec\alpha$

d) $\sec\alpha$ ◆

39. $\tan(\alpha+90^\circ)=$

a) $-\sin\alpha$
b) $-\cot\alpha$ ◆
c) $\cot\alpha$
d) $\tan\alpha$
e) $-\tan\alpha$

40. $\sec(\alpha+90^\circ)=$

a) $-\sin\alpha$
b) $\sec\alpha$
c) $-\sec\alpha$
d) $-\csc\alpha$ ◆

41. $\sec\left(\alpha+\dfrac{\pi}{2}\right)=$

a) $\sec\alpha$
b) $-\csc\alpha$ ◆
c) $\cot\alpha$
d) $-\cot\alpha$

42. $\sin(\pi+\alpha)=$

a) $\cos\alpha$
b) $-\cos\alpha$
c) $-\sin\alpha$
d) $\sin\alpha$ ◆

43. $\csc(\pi-\alpha)=$

a) $\sec\alpha$
b) $-\sec\alpha$
c) $-\csc\alpha$

d) $\csc\alpha$ ◆

44. $\cot(\pi-\alpha)=$

a) $\sin\alpha$
b) $\cot\alpha$
c) $-\cot\alpha$ ◆
d) $\tan\alpha$

45. $\csc\left(\alpha+\frac{\pi}{2}\right)=$

a) $\sec\alpha$ ◆
b) $-\csc\alpha$
c) $\cot\alpha$
d) $-\cot\alpha$

46. $\sin(\pi-\alpha)=$

a) $-\cos\alpha$
b) $\cos\alpha$
c) $-\sin\alpha$
d) $\sin\alpha$ ◆

47. $\sec(\pi-\alpha)=$

a) $\sec\alpha$
b) $-\sec\alpha$ ◆
c) $-\csc\alpha$
d) $\csc\alpha$

48. $\cos(\pi+\alpha)=$

a) $\cos\alpha$
b) $-\cos\alpha$ ◆
c) $-\sin\alpha$
d) $\sin\alpha$

49. $\tan(\pi-\alpha)=$

a) $\sin\alpha$
b) $\cot\alpha$
c) $-\cot\alpha$
d) $-\tan\alpha$ ◆

50. $\cos(\pi-\alpha)=$

a) $-\cos\alpha$ ◆
b) $\cos\alpha$
c) $-\sin\alpha$
d) $\sin\alpha$

51. $\csc\left(\alpha+\frac{\pi}{2}\right)=$

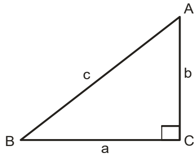
a) $\sec\alpha$
b) $-\csc\alpha$
c) $\cot\alpha$
d) $-\sec\alpha$ ◆

52. If $y=\frac{2\sin\alpha}{1+\cos\alpha+\sin\alpha}$ then $\frac{1-\cos\alpha+\sin\alpha}{1+\sin\alpha}$ is equal to

a) 1/y
b) Y ◆
c) 1 – y
d) 1 + y

.

53. In the triangle ABC, where C is the right angle,
tan A + tan B =



a) $a + b$

b) $\dfrac{a^2 + b^2}{ab}$ ◆

c) a^2 / bc

d) b^2 / ac

54. $\sin(2\pi - \theta) =$

a) $\sin\theta$

b) $-\sin\theta$ ◆

c) $\cos\theta$

d) $-\sin\theta$

55. The value of the expression

$\dfrac{1-\sin^2 y}{1+\cos y} + \dfrac{1-\cos y}{\sin y} - \dfrac{\sin y}{1-\cos y}$ is

a) 0 ◆

b) 1

c) Sin y

d) Cos y

56. $Cos(2\pi - \theta) =$ _______?

a) $\sin\ \theta$

b) $-\sin\theta$

c) $\cos\theta$ ◆

d) $-\cos\theta$

e) $\tan\theta$

57. $\cot(\alpha - \beta) =$

a) $\dfrac{\cot\alpha - \cot\beta}{1+\cot\alpha\cot\beta}$

b) $\dfrac{\cot\alpha + \cot\beta}{1-\cot\alpha\cot\beta}$ ◆

c) $\dfrac{\cot\alpha\cot\beta - 1}{\cot\alpha + \cot\beta}$

d) $\dfrac{\cot\alpha\cot\beta + 1}{-\cot\alpha + \cot\beta}$

58. $\tan(\alpha-\beta) =$

a) $\dfrac{\tan\alpha - \tan\beta}{1+\tan\alpha\tan\beta}$ ◆

b) $\dfrac{\tan\alpha + \tan\beta}{1-\tan\alpha\tan\beta}$

c) $\dfrac{\cot\alpha + \cot\beta}{1-\cot\alpha\cot\beta}$

d) $\dfrac{\cot\alpha - \cot\beta}{1+\cot\alpha\cot\beta}$

59. $\tan(\pi+\alpha) =$

a) $\tan\alpha$ ◆
b) $-\tan\alpha$
c) $\cot\alpha$
d) $-\cot\alpha$

60. $\sec(\pi+\alpha) =$

a) $\tan\alpha$
b) $-\csc\alpha$
c) $\csc\alpha$
d) $-\sec\alpha$ ◆

61. $\csc(\pi+\alpha)=$

a) $\tan\alpha$
b) $-\csc\alpha$
c) $\csc\alpha$
d) $-\sec\alpha$ ◆

62. $\tan(\alpha+\beta)=$

a) $\dfrac{\tan\alpha-\tan\beta}{1+\tan\alpha\tan\beta}$
b) $\dfrac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta}$ ◆
c) $\dfrac{\cot\alpha+\cot\beta}{1-\cot\alpha\cot\beta}$
d) $\dfrac{\cot\alpha-\cot\beta}{1+\cot\alpha\cot\beta}$

63. $\cot(\alpha+\beta)=$

a) $\dfrac{\cot\alpha-\cot\beta}{1+\cot\alpha\cot\beta}$ ◆
b) $\dfrac{\cot\alpha+\cot\beta}{1-\cot\alpha\cot\beta}$
c) $\dfrac{\cot\alpha\cot\beta-1}{\cot\alpha+\cot\beta}$
d) $\dfrac{\cot\alpha\cot\beta+1}{\cot\alpha+\cot\beta}$

64. $2\cos^2\left(\dfrac{\alpha}{2}\right)=$

a) $1+\cos\alpha$ ◆
b) $1-\cos\alpha$
c) $1+\sin\alpha$
d) $1-\sin\alpha$

e) $1 - 2\sin^2\alpha$

65. Sin α =

a) $1-2\sin^2\dfrac{\alpha}{2}$

b) $2\cos^2\dfrac{\alpha}{2}+1$

c) $\sin\dfrac{\alpha}{2}\cos\dfrac{\alpha}{2}$

d) $2\sin\dfrac{\alpha}{2}\cos\dfrac{\alpha}{2}$ ◆

66. Cos α =

a) $\cos^2\dfrac{\alpha}{2}+\sin^2\dfrac{\alpha}{2}$

b) $\cos^2\dfrac{\alpha}{2}-\sin^2\dfrac{\alpha}{2}$ ◆

c) $\cos^2\alpha-\sin^2\alpha$

d) $\cos^2\alpha+\sin^2\alpha$

e) $2\sin\alpha$

67. Cos α =

a) $1-2\sin^2\dfrac{\alpha}{2}$ ◆

b) $2\cos^2\dfrac{\alpha}{2}+1$

c) $2\cos^2\alpha-1$

d) $2\cos^2\alpha+1$

68. $2\sin^2\left(\dfrac{\alpha}{2}\right)=$

a) $1+\cos\alpha$

b) $1-\cos\alpha$ ◆

c) $1+\sin\alpha$

d) $1-\sin\alpha$

69. $Tan(2\pi-\theta)=$ _______?

a) $Cot\theta$

b) $-Cot\theta$

c) $Tan\theta$

d) $-Tan\theta$ ◆

70. $Cos(2\pi+\theta)=$ _______?

a) $\text{Sin}\theta$

b) $-\text{Sin}\theta$

c) $\text{Cos}\theta$ ◆

d) $-\text{Cos}\theta$

71. $Tan(2\pi+\theta)=$ _______?

a) $\text{Cot}\theta$ ◆

b) $-\text{Sin}\theta$

c) $\text{Tan}\theta$

d) $-\text{Tan}\theta$

72. $Sin(2\pi+\theta)=$

a) $\text{Sin}\theta$ ◆

b) $-\text{Sin}\theta$

c) $\text{Cos}\theta$

d) $-\text{Cos}\theta$

73. $1+Cos2\alpha=$

a) $2\sin\alpha$

b) $2\cos\alpha$

c) $2\sec\alpha$

d) $2\cos^2\alpha$ ◆

74. $\text{Cos}2\alpha$ =

a) $1 + \cos\alpha$
b) $1\sin^2\alpha + 1$
c) $2\cos^2\alpha - 1$ ◆
d) $2\cos^2\alpha + 1$

75. $\text{Sin}2\alpha$ =

a) $\text{Cos}^2\alpha - \text{Sin}^2\alpha$
b) $2\text{Sin}^2\alpha + 1$
c) $2\text{Sin}\alpha \ \text{Cos}\alpha$ ◆
d) $\text{Sin}\alpha \ \text{Cos}\alpha$

76. $\text{Cos}2\alpha$ =

a) $\cos^2\alpha + \sin^2\alpha$
b) $2\sin^2\alpha + 1$
c) $2\sin^2\alpha - 1$
d) $2\cos^2\alpha - 1$ ◆

77. $\text{Sin}\alpha$ =

a) $\pm\sqrt{\frac{1-\cos 2\alpha}{2}}$ ◆
b) $\pm\sqrt{\frac{1+\cos 2\alpha}{2}}$
c) $\pm\sqrt{\frac{1+\sin 2\alpha}{2}}$

d) $\pm\sqrt{\frac{1-\sin 2\alpha}{2}}$

78. $1 + \cos 4\alpha$ =
   a) $2\cos^2\alpha$ ◆
   b) $4\sin^2\alpha$
   c) $4\cos^2\alpha$
   d) $2\sin^2 2\alpha$

79. $1 - \cos 4\alpha$ =
   a) $2\cos^2\alpha$
   b) $4\sin^2\alpha$
   c) $4\cos^2\alpha$ ◆
   d) $2\sin^2 2\alpha$

80. $\text{Cos}\,\alpha$ =
   a) $\pm\sqrt{\frac{1-\cos 2\alpha}{2}}$
   b) $\pm\sqrt{\frac{1+\cos 2\alpha}{2}}$ ◆
   c) $\pm\sqrt{\frac{1+\sin 2\alpha}{2}}$
   d) $\pm\sqrt{\frac{1-\sin 2\alpha}{2}}$

81. $1 - \cos 3\alpha$ =
   a) $2\cos^2\left(\frac{3\alpha}{2}\right)$ ◆

b) $2\sin^2\left(\frac{3\alpha}{2}\right)$

c) $\frac{3}{2}\cos^2\left(\frac{3\alpha}{2}\right)$

d) $2\sin^2 2\alpha$

82. $1+\cos 6\alpha =$

a) $3\sin^2 \alpha$

b) $2\sin^2 3\alpha$

c) $3\sin^2 3\alpha$

d) $2\cos^2 3\alpha$ ◆

83. $1-\cos 5\alpha =$

a) $2\cos^2\left(\frac{5\alpha}{2}\right)$

b) $2\sin^2\left(\frac{5\alpha}{2}\right)$ ◆

c) $\frac{5}{2}\cos^2\left(\frac{3\alpha}{2}\right)$

d) $2\sin^2 2\alpha$

84. $1+\cos 5\alpha =$

a) $2\cos^2\left(\frac{5\alpha}{2}\right)$ ◆

b) $2\sin^2\left(\frac{5\alpha}{2}\right)$

c) $\frac{5}{2}\cos^2\left(\frac{3\alpha}{2}\right)$

d) $2\sin^2 2\alpha$

85. $1+\cos 3\alpha =$

a) $2\cos^2\left(\frac{3\alpha}{2}\right)$ ◆

b) $\sin^2\left(\frac{3\alpha}{2}\right)$

c) $\frac{3}{2}\cos^2\left(\frac{3\alpha}{2}\right)$

d) $2\sin^2 2\alpha$

86. $\tan 2\alpha =$

a) $\frac{2\tan^2\alpha}{1-\tan\alpha}$

b) $\frac{2\tan\alpha}{1-\tan^2\alpha}$ ◆

c) $\frac{2\tan\alpha}{1-\tan^2\alpha}$

d) $\frac{2\cot\alpha}{1+\cot^2\alpha}$

87. $\tan 4\alpha =$

a) $\frac{4\tan^2\alpha}{1-\tan\alpha}$ ◆

b) $\frac{2\tan 2\alpha}{1+\tan^2 2\alpha}$

c) $\frac{2\tan 2\alpha}{1-\tan^2 2\alpha}$

d) $\frac{4\tan 2\alpha}{1-\tan^2 2\alpha}$

88. $\cos 3\alpha =$

a) $4\cos^3\alpha - 3\cos\alpha$ ◆

b) $3\cos^3\alpha - 4\cos\alpha$
c) $3\sin\alpha - 4\sin^3\alpha$
d) $4\sin\alpha - 3\sin^3\alpha$

89. $\sin 3\alpha =$
a) $4\cos^3\alpha - \cos\alpha$
b) $3\cos^3\alpha - 4\cos\alpha$
c) $3\sin\alpha - 4\sin^3\alpha$ ◆
d) $4\sin\alpha - 3\sin^3\alpha$

90. $\tan 3\alpha =$
a) $\dfrac{3\tan\alpha - \tan^3\alpha}{1 - 3\tan^2\alpha}$ ◆
b) $\dfrac{3\tan\alpha + \tan^3\alpha}{1 - 3\tan^2\alpha}$
c) $\dfrac{3\tan\alpha - \tan^3\alpha}{1 + 3\tan^2\alpha}$
d) $\dfrac{3\cot\alpha - \cot^3\alpha}{1 - 3\cot^2\alpha}$

91. $\sin 2\alpha =$
a) $\dfrac{1 + \tan^2\alpha}{1 - \tan^2\alpha}$ ◆
b) $\dfrac{2\tan\alpha}{1 - \tan^2\alpha}$
c) $\dfrac{1 + \tan^2\alpha}{1 - \tan^2\alpha}$
d) $\dfrac{2\tan\alpha}{1 + \tan^2\alpha}$

92. $\cos 12\alpha$
a) $3\cos^3\alpha - 4\cos 4\alpha$
b) $4\cos^3 4\alpha - 3\cos 4\alpha$ ◆

c) $3\sin 4\alpha - 4\sin^3 4\alpha$
d) $4\sin 4\alpha - 3\sin^3 4\alpha$

93. sin9 α
a) $4\cos^3 \alpha - 3\cos \alpha$
b) $3\cos^3 3\alpha - 4\cos 3\alpha$
c) $3\sin 3\alpha - 4\sin^3 3\alpha$ ◆
d) $4\sin 3\alpha - 3\sin^3 3\alpha$

94. cos9 α
a) $4\cos^3 \alpha - 3\cos 3\alpha$ ◆
b) $3\cos^3 3\alpha - 4\cos 3\alpha$
c) $3\sin 3\alpha - 4\sin^3 3\alpha$
d) $4\sin 3\alpha - 3\sin^3 3\alpha$

95. 2cos α cos $\beta =$
a) $\cos(\alpha+\beta)+\cos(\alpha-\beta)$ ◆
b) $\cos(\alpha+\beta)-\cos(\alpha-\beta)$
c) $\sin(\alpha+\beta)+\sin(\alpha-\beta)$
d) $\sin(\alpha+\beta)-\sin(\alpha-\beta)$

96. cos2 α =
a) $\dfrac{1+\tan^2\alpha}{1-\tan^2\alpha}$ ◆
b) $\dfrac{2\tan\alpha}{1-\tan^2\alpha}$
c) $\dfrac{1-\tan^2\alpha}{1+\tan^2\alpha}$
d) $\dfrac{2\tan\alpha}{1+\tan^2\alpha}$

97. cos2 α =
a) $\cos(\alpha+\beta)+\cos(\alpha-\beta)$
b) $\cos(\alpha+\beta)-\cos(\alpha-\beta)$

c) $\sin(\alpha+\beta)+\sin(\alpha-\beta)$

d) None of these ◆

98. $2\cos\alpha\ \sin\beta =$

a) $\cos(\alpha+\beta)+\cos(\alpha-\beta)$

b) $\cos(\alpha+\beta)-\cos(\alpha-\beta)$

c) $\sin(\alpha+\beta)+\sin(\alpha-\beta)$

d) $\sin(\alpha+\beta)-\sin(\alpha-\beta)$ ◆

99. $2\sin\alpha\ \sin\beta =$

a) $\cos(\alpha+\beta)+\cos(\alpha-\beta)$

b) $\cos(\alpha-\beta)-\cos(\alpha+\beta)$ ◆

c) $\sin(\alpha+\beta)+\sin(\alpha-\beta)$

d) $\sin(\alpha+\beta)-\sin(\alpha-\beta)$

100. $\cos\theta-\cos\phi =$

a) $-2\sin\dfrac{\theta+\phi}{2}\sin\dfrac{\theta-\phi}{2}$ ◆

b) $2\sin\dfrac{\theta+\phi}{2}\sin\dfrac{\theta-\phi}{2}$

c) $2\sin\dfrac{\theta+\phi}{2}\cos\dfrac{\theta-\phi}{2}$

d) $2\cos\dfrac{\theta+\phi}{2}\cos\dfrac{\theta-\phi}{2}$

101. $\sin\theta+\sin\phi =$

a) $-2\sin\dfrac{\theta+\phi}{2}\sin\dfrac{\theta-\phi}{2}$

b) $2\sin\dfrac{\theta+\phi}{2}\sin\dfrac{\theta-\phi}{2}$

c) $2\sin\frac{\theta+\phi}{2}\cos\frac{\theta-\phi}{2}$ ◆

d) $2\cos\frac{\theta+\phi}{2}\cos\frac{\theta-\phi}{2}$

102. $\sin\theta-\sin\phi=$

a) $-2\sin\frac{\theta+\phi}{2}\sin\frac{\theta-\phi}{2}$

b) $2\sin\frac{\theta+\phi}{2}\sin\frac{\theta-\phi}{2}$

c) $2\sin\frac{\theta+\phi}{2}\cos\frac{\theta-\phi}{2}$

d) $2\cos\frac{\theta+\phi}{2}\cos\frac{\theta-\phi}{2}$ ◆

103. $\cos\frac{\pi}{12}=$

a) $\frac{\sqrt{3}-1}{2\sqrt{2}}$

b) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ ◆

c) $\frac{\sqrt{3}+1}{\sqrt{2}}$

d) $\frac{\sqrt{3}-1}{\sqrt{2}}$

104. $\text{Cos}315^{\circ}=$

a) $\frac{1}{\sqrt{2}}$ ◆

b) $-\frac{1}{\sqrt{2}}$

c) $\frac{3}{\sqrt{2}}$

d) $-\frac{3}{\sqrt{2}}$

105. Cos540º =

a) $\frac{1}{\sqrt{2}}$

b) $-\frac{1}{\sqrt{2}}$

c) $\frac{3}{\sqrt{2}}$

d) – 1 ◆

106. Tan (- 135º) =

a) $\frac{1}{\sqrt{2}}$

b) $-\frac{1}{\sqrt{2}}$

c) $\frac{3}{\sqrt{2}}$

d) 1 ◆

107. sec(- 300º) =

a) 4

b) 3

c) 2 ◆

d) 1

108. cot (- 855º) =

a) 2

b) 1 ◆

c) – 1

d) 0

109. $\sec(-960^\circ) =$

a) 2
b) 1
c) -1
d) -2 ◆

110. $\sin(-780^\circ) =$

a) $-\frac{\sqrt{3}}{2}$
b) $\frac{\sqrt{3}}{2}$ ◆
c) $\frac{2}{\sqrt{3}}$
d) 0

111. $\cos 254^\circ =$

a) $-\cos 33^\circ$
b) $\text{Cos}5^\circ$
c) $\text{Cos}16^\circ$
d) $-\sin 16^\circ$ ◆

112. $\cos(-435^\circ) =$

a) $\cos 15^\circ$ ◆
b) $-\cos 15^\circ$
c) $-\sin 15^\circ$
d) $\text{Sin}15^\circ$

113. $\sin(\alpha+\beta).\cos(\alpha-\beta) =$

a) $\sin\alpha - \sin\beta$
b) $\sin\alpha + \sin\beta$

c) $\sin^2\alpha - \sin^2\beta$ ◆

d) $\sin^2\alpha - \sin^2\beta + 1$

114. $\sin(\alpha+\beta).\sin(\alpha-\beta) =$

a) $\sin\alpha - \sin\beta$

b) $\sin\alpha + \sin\beta$

c) $\sin^2\alpha - \sin^2\beta$ ◆

d) $\cos^2\beta - \cos^2\alpha$

115. $\sin(45^\circ + \alpha) =$

a) $\sin\alpha + \cos\alpha$ ◆

b) $\sin\alpha - \cos\alpha$

c) $\frac{1}{\sqrt{2}}(\sin\alpha + \cos\alpha)$

d) $\frac{1}{\sqrt{2}}(\sin\alpha - \cos\alpha)$

116. $\tan(180^\circ + \theta) =$

a) $\cot\theta$ ◆

b) $\tan\theta$

c) $\sin\theta$

d) $-\tan\theta$

117. $\cos(\alpha+\beta).\cos(\alpha-\beta) =$

a) $\cot 2\alpha$

b) $\cos^2\alpha - \cos^2\beta$ ◆

c) $\sin 2\alpha$

d) $\tan 2\alpha$

118. $\dfrac{\tan\alpha+\tan\beta}{\tan\alpha-\tan\beta}$

a) $\dfrac{\cos(\alpha+\beta)}{\cos(\alpha-\beta)}$ ◆

b) $\dfrac{\cos(\alpha-\beta)}{\cos(\alpha+\beta)}$

c) $\dfrac{\sin(\alpha-\beta)}{\sin(\alpha+\beta)}$

d) $\dfrac{\sin(\alpha+\beta)}{\sin(\alpha-\beta)}$

119. $\cos^4\theta =$

a) $\dfrac{1}{8}[3-4\cos 2\theta+2\cos 4\theta]$

b) $\dfrac{1}{8}[3+4\cos 2\theta+2\cos 4\theta]$ ◆

c) $4\sin^3\theta\ \cos\theta$

d) $-4\text{cosn}^3\theta\ \sin\theta$

120. $\sqrt{\dfrac{1+\sin\alpha}{1-\sin\alpha}} =$

a) $\dfrac{\tan\dfrac{\alpha}{2}+\cos\dfrac{\alpha}{2}}{\tan\dfrac{\alpha}{2}-\cos\dfrac{\alpha}{2}}$

b) $\dfrac{\sin\dfrac{\alpha}{2}-\cos\dfrac{\alpha}{2}}{\sin\dfrac{\alpha}{2}+\cos\dfrac{\alpha}{2}}$

c) $\dfrac{\sin\dfrac{\alpha}{2}+\cos\dfrac{\alpha}{2}}{\sin\dfrac{\alpha}{2}-\cos\dfrac{\alpha}{2}}$

d) $\dfrac{\tan\dfrac{\alpha}{2}-\cos\dfrac{\alpha}{2}}{\tan\dfrac{\alpha}{2}+\cos\dfrac{\alpha}{2}}$ ◆

121. $\dfrac{\sin 3\theta}{\cos\theta}+\dfrac{\cos 3\theta}{\sin\theta}=$
   a) $\sin\theta$
   b) $2\cot 2\theta$ ◆
   c) $\cos\theta$
   d) $-\sec\theta$

122. $2\sin 3\theta\ \cos\theta =$
   a) $\cot 4\theta + \cot 2\theta$
   b) $\cos 4\theta + \cos 2\theta$
   c) $\cos 4\theta - \cos 2\theta$
   d) $\sin 4\theta + \sin 2\theta$ ◆

123. $\sin 5\theta + \sin 3\theta =$
   a) $2\cos 2\theta\ \sin\theta$
   b) $-2\cos 4\theta\ \sin\theta$
   c) $-2\sin 4\theta\ \cos\theta$
   d) $2\sin 4\theta\ \cos\theta$ ◆

124. $2\sin 12^\circ\ \sin 46^\circ =$
   a) $\cos 34^\circ\ \cos 58^\circ$ ◆
   b) $\sin 34^\circ + \sin 58^\circ$
   c) $\sin 34^\circ - \sin 58^\circ$
   d) $\cos 34^\circ + \cos 58^\circ$

125. $\dfrac{\cos x-\cos 3x}{\sin 3x-\sin x}=$

a) cot2x ◆
b) tan2x
c) csc2x
d) sec2x

126. $\csc(-\alpha)=$

a) - cos α
b) $-$ sec α
c) sec α
d) $-$ csc α ◆

127. cot (α - 90°) =

a) tan α
b) $-$ tan α ◆
c) $-$ cot α
d) cot α

128. $\csc\left(\dfrac{\pi}{2}-\alpha\right)=$

a) $-$ csc α ◆
b) csc α
c) $-$ sec α
d) sec α

129. $\tan\left(\alpha+\dfrac{\pi}{2}\right)=$

a) tan α
b) $-$ tan α
c) cot α

d) $-\cot\alpha$ ◆

130. $\cot\left(\alpha+\frac{\pi}{2}\right)=$

a) $\tan\alpha$
b) $-\tan\alpha$ ◆
c) $\cot\alpha$
d) $-\cot\alpha$

131. $\cos\alpha$ =

a) $1-2\sin^2\frac{\alpha}{2}$ ◆

b) $2\cos^2\frac{\alpha}{2}+1$

c) $2\cos^2\alpha$ - 1
d) $2\cos^2\alpha$ + 1

132. $1-\cos 2\alpha$ =
a) $2\sin\alpha$
b) $2\cos\alpha$
c) $2\sec\alpha$
d) $2\sin^2\alpha$ ◆

133. $1-\cos 6\alpha$ =
a) $3\sin^2\alpha$
b) $2\sin^2 3\alpha$ ◆
c) $3\sin^2 3\alpha$
d) $2\sin^2 2\alpha$

134. $\cos\theta+\cos\phi=$

a) $-2\sin\frac{\theta+\phi}{2}\sin\frac{\theta-\phi}{2}$

b) $2\sin\frac{\theta+\phi}{2}\sin\frac{\theta-\phi}{2}$

c) $2\sin\frac{\theta+\phi}{2}\cos\frac{\theta-\phi}{2}$

d) $2\cos\frac{\theta+\phi}{2}\cos\frac{\theta-\phi}{2}$ ◆

Unit 11: Trigonometric Functions and their Graphs

1. Range of the sine function is ________?
   a) {x | - 1 < x > 1}
   b) {x | - 1 < x < 1}
   c) {x | 0 x > 1}
   d) None of these ◆

2. The domain of sinx is
   a) [- 1 , 1]
   b) R ◆
   c) R - $\left\{x \middle| x = (2n+1)\frac{\pi}{2}, n \in Z\right\}$
   d) $R - \left\{x \middle| x = n\pi, n \in Z\right\}$

3. Range of the cosine function is = __________?
   a) {x | - 1 < x > 1}
   b) {x | - 1 < x < 1}
   c) {x | 0 x > 1}
   d) None of these ◆

4. The domain of the cosx is
   a) [-1, 1]
   b) R ◆
   c) R - $\left\{x \middle| x = (2n+1)\frac{\pi}{2}, n \in Z\right\}$
   d) $R - \left\{x \middle| x = n\pi, n \in Z\right\}$

5. The domain of tanx is

a) [-1, 1]
b) R
c) R - $\left\{x \middle| x=(2n+1)\frac{\pi}{2}, n\in Z\right\}$ ◆
d) $R-\{x|x=n\pi, n\in Z\}$

6. The domain of cotx is
a) [-1, 1]
b) R
c) R - $\left\{x \middle| x=(2n+1)\frac{\pi}{2}, n\in Z\right\}$
d) $R-\{x|x=n\pi, n\in Z\}$ ◆

7. The domain of secx is

a) [-1, 1]
b) R
c) R - $\left\{x \middle| x=(2n+1)\frac{\pi}{2}, n\in Z\right\}$ ◆
d) $R-\{x|x=n\pi, n\in Z\}$

8. The domain of cscx is
a) [-1, 1]
b) R
c) R - $\left\{x \middle| x=(2n+1)\frac{\pi}{2}, n\in Z\right\}$
d) $R-\{x|x=n\pi, n\in Z\}$ ◆

9. The range of sinx is

a) [-1, 1] ◆

b) R

c) R - $\left\{x \middle| x=(2n+1)\frac{\pi}{2}, n \in Z\right\}$

d) $R-\{x | x=n\pi, n \in Z\}$

10. The range of cosx is

a) [-1, 1] ◆

b) R

c) R - $\left\{x \middle| x=(2n+1)\frac{\pi}{2}, n \in Z\right\}$

d) $R-\{x | x=n\pi, n \in Z\}$

11. The range of tanx is

a) [-1, 1]

b) R ◆

c) R - $\left\{x \middle| x=(2n+1)\frac{\pi}{2}, n \in Z\right\}$

d) $R-\{x | x=n\pi, n \in Z\}$

12. The range of cotx is

a) [-1, 1]

b) R ◆

c) R - $\left\{x \middle| x=(2n+1)\frac{\pi}{2}, n \in Z\right\}$

d) $R-\{x | x=n\pi, n \in Z\}$

13. The range of secx is

a) [-1, 1]

b) R

c) R - $\left\{ x \middle| x = (2n+1)\frac{\pi}{2}, n \in Z \right\}$ ◆

d) $R - \{x | x = n\pi, n \in Z\}$

14. The range of csc x is

a) [-1, 1]

b) R

c) R - $\left\{ x \middle| x = (2n+1)\frac{\pi}{2}, n \in Z \right\}$

d) $R - \{x | -1 < x < 1\}$ ◆

15. A function f(x) is said to be the periodic function if, for all x in the domain of f, here exists a smallest positive number p such that f(x + p) =

a) f(p)

b) f(x) ◆

c) 0

d) P

16. If, for all x in the domain of f, there exists a smallest positive number p such that f(x + p) = f(x), then p is the

a) period of f ◆

b) period of 2f'

c) period of 3f

d) period of 4f

17. The period of sinx is

a) $\frac{\pi}{3}$

b) $\frac{\pi}{2}$

c) $\frac{2\pi}{3}$

d) 2π ◆

18. The period of cosx is

a) $\frac{\pi}{3}$

b) $\frac{\pi}{2}$

c) $\frac{2\pi}{3}$

d) 2π ◆

19. The period of tanx is

a) $\frac{\pi}{3}$

b) $\frac{\pi}{2}$

c) $\frac{2\pi}{3}$

d) π ◆

20. The period of cotx is

a) $\frac{\pi}{3}$

b) $\frac{\pi}{2}$

c) $\frac{2\pi}{3}$

d) 2π ◆

21. The period of sec x is

a) $\frac{\pi}{3}$

b) $\frac{\pi}{2}$

c) $\frac{2\pi}{3}$

d) 2π ◆

22. The period of cosec x is

a) $\frac{\pi}{3}$

b) $\frac{\pi}{2}$

c) $\frac{2\pi}{3}$

d) 2π ◆

23. The period of sin2x is

a) $\frac{\pi}{3}$

b) $\frac{\pi}{2}$

c) $\frac{2\pi}{3}$

d) π ◆

24. The period of cos2x is

a) $\frac{\pi}{3}$

b) $\frac{\pi}{2}$

c) $\frac{2\pi}{3}$

d) π ◆

25. The period of tan 2x is

a) $\frac{\pi}{3}$

b) $\frac{\pi}{2}$ ◆

c) $\frac{2\pi}{3}$

d) π

26. The period of cot2x is

a) $\frac{\pi}{3}$

b) $\frac{\pi}{2}$ ◆

c) $\frac{2\pi}{3}$

d) π

27. The period of sec2x is

a) $\frac{\pi}{3}$

b) $\frac{\pi}{2}$

c) $\frac{2\pi}{3}$

d) π ◆

28. The period of cosec 2x is

a) $\frac{\pi}{3}$
b) $\frac{\pi}{2}$
c) $\frac{2\pi}{3}$
d) π ◆

29. The period of sin3x is
a) $\frac{\pi}{3}$
b) $\frac{\pi}{2}$
c) $\frac{2\pi}{3}$ ◆
d) π

30. The period of cos7x is
a) $\frac{\pi}{3}$
b) $\frac{\pi}{2}$
c) $\frac{2\pi}{7}$ ◆
d) π

31. The period of cos $\frac{x}{3}$ is
a) π
b) 2 π
c) 3 π
d) 6 π ◆

32. The period of tan $\frac{x}{3}$ is

a) π
b) 2π
c) 3π ◆
d) 4π

33. The period of cot $\frac{x}{3}$ is

a) π
b) 2π
c) 3π ◆
d) 4π

34. The period of sec $\frac{x}{3}$ is

a) π
b) 2π
c) 3π
d) 6π ◆

35. The period of cot3x is

a) $\frac{\pi}{3}$ ◆
b) $\frac{\pi}{2}$
c) $\frac{2\pi}{3}$
d) π

36. The period of tan 3x is

a) $\frac{\pi}{3}$ ◆

b) $\frac{\pi}{2}$

c) $\frac{2\pi}{3}$

d) π

37. The period of $3\tan\frac{x}{3}$ is

a) π

b) 2π

c) 3π ◆

d) 4π

38. The period of $3\sec\frac{x}{3}$ is

a) π

b) 2π

c) 3π

d) 6π ◆

39. The period of $15\csc\frac{x}{3}$ is

a) π

b) 2π

c) 3π

d) 6π ◆

Unit 12: Limit and Continuity

1) The domain of binary relation $y^2 = -4x$ is,

A) R
B) Z
C) R^+
D) Negative real numbers including zero. ◆

2) If S = {a, b, c} then the number of distinct relations on S is

A) 9
B) 2^9 ◆
C) 2^3
D) 9^2

3) The domain of the binary relation $2x^2 + 2y^2 = 18$ is

A) R
B) R^+
C) Z
D) {- 3, 3} ◆

4) The range of the binary relation $4x^2 + 9y^2 = 36$ is

A) {- 2, 2} ◆
B) {– 3, 3}
C) {- 2, 3}
D) R

5) If R1 = $\{(x, y) \mid x, y \in R \text{ and } x > y\}$ is a binary relation then its inverse is

A) {(1, 2), (2, 3)}
B) {(2, 1), (3, 2), (4, 3)}
C) $\{(x, y) \mid x = y\}$

D) $\{(x, y) \mid x, y \in R \text{ and } y > x\}$ ◆

6) The graph of the binary relation $y = x^2 - 6x + 5$ represents

A) Line
B) Circle
C) Parabola ◆
D) Ellipse

7) The graph of $R_1 = \{(x, y) \mid x, y \in \mathbf{R} \text{ and } y > x\}$ is

A) Line
B) Points on the line $y = x$
C) All points below the line $y = x$
D) All points above the line $y = x$ ◆

8) If $f(x) = ax + b$, where $a, b \in R$, $a \neq 0$, then f is called a

A) Constant Function
B) Linear Function ◆
C) Quadratic Function
D) Polynomial Function

9) The graph of a linear function represents a

A) Circle
B) Line ◆
C) Parabola
D) Ellipse

10) The equation having null set as its solution set is

A) $x = \cos x$
B) $x = e^x$ ◆
C) $x = \sin x$
D) $x = \tan x$

11) The composition of two functions f and g is defined as (fog) (x) = f {g (x)}, for all x in the set

A) R_g
B) D_g
C) $D_g \cap D_f$
D) $R_g \cap D_f$ ◆

12) If $f(x) = x$ and $g(x) = x^2$ then the value of
(fog) (x) is
A) x^2 ◆
B) x
C) x^3
D) x^4

13) Let f: $S \to T$ be a one – to – one function such that $f(x_1) = 6$
and $f(2) = 6$ then the value of x_1 is :
A) 6
B) 2 ◆
C) 3
D) 12

14) Let $f(x) = 5x + 3$ then f is
A) One – to – one function
B) Onto function
C) Constant function
D) Both one-to-one and onto function ◆

15) Let : $S \to S$ be an identity function and $2 \in S$, then the value
of f(2) is
A) 2
B) – 2
C) 3
D) ½

16) Let g = {(1, 1), (2, 3), (3, 2), (4, 4)} be a function from S onto
S, then the value of g^{-1} (2) is,

A) 2 ◆
B) 3
C) 4
D) 1

17) Let $f(x) = 5x + 1$, $x \in R$ then value of $f^{-1}(6)$ is,
A) 31
B) 1 ◆
C) 6
D) 1/6

18) If $g(x) = 2x + 1$ then the value of $g^2(1)$ is
A) 3
B) 9 ◆
C) 7
D) 8

19) The graph of the function $y = x$ and $y = \tan x$ intersect at the point
A) $x = \pi/4$
B) $x = 0$ ◆
C) $x = \pi/2$
D) $x = \pi/3$

20) The solution set of the equation $x = \tan x$ is
A) ϕ
B) $\{\pi/4\}$
C) $\{1\}$
D) $\{0\}$ ◆

21) The solution set of $2x^3 - 3x^2 + 4x - 5 = 0$ can have at the most,
A) 4 members
B) 3 members ◆
C) 2 members

D) 5 members

22) If f (x) = $2x^2 - 1$ and g(x) = 5x + 2 then value of f[g(2)] is

A) 312
B) 87
C) 287 ◆
D) 288

23) The inverse function of the function $y = \dfrac{x-1}{x+1}, \quad x \neq -1$ is

A) $f^{-1}(y) = \dfrac{y+1}{y-1}$
B) $f^{-1}(y) = \dfrac{1-y}{1+y}$ ◆
C) $f^{-1}(y) = \dfrac{1+y}{1-y}$
D) $f^{-1}(y) = \dfrac{1-y}{y-1}$

24) If $y = \dfrac{x}{x+2}, \quad x \neq -2$ is a function then the value of $f^{-1}(2)$ is,

(Here y = f(x))

A) ½
B) 4
C) ¼
D) – 4 ◆

25) If the variable x takes in succession the value

$3, 3\frac{1}{2}, 3\frac{2}{3}, 3\frac{4}{5}, 3\frac{5}{8}, \ldots$ then x approaches

A) 4 ◆
B) 3

C) $3\frac{5}{8}$
D) 5

26) If h > 0, then as h approaches zero, $\tan(\frac{3\pi}{2}+h)$ approaches

A) - ∞
B) ∞
C) 0 ◆
D) – 1

27) The values of $Lim_{h\to 0}\, Co\sec(\pi+h),\ h>0$ is

A) 0
B) ∞
C) - ∞ ◆
D) – 1

28) The value of $Lim_{x\to 0}\frac{\sin ax}{bx}$ is

A) a
B) $\frac{a}{b}$ ◆
C) b
D) $\frac{b}{a}$

29) The value of $Lim_{x\to\infty}(1+\frac{4}{x})^{\frac{x}{4}}$ is

A) e^4
B) $\frac{e}{4}$
C) $\frac{4}{e}$

D) e ◆

Unit 13: Differentiation

1) Let f be a real value function and x ∈ D_f then

$\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ when it exists is called

A) The derivative of f at a
B) The derivative of f at h
C) The derivative of f at x ◆
D) The derivative of f at x = h

2) The value of the $\lim_{x\to a}\frac{x^7-a^7}{x-a}$ is equal to

A) 0
B) 0/0
C) $7a^7$
D) $7a^6$ ◆

3) The derivative of $\frac{ax+b}{cx+d}$ w.r.t $\frac{ax+b}{cx+d}$ is

A) $\frac{b}{(cx+d)^2}$
B) $\frac{a}{(cx+d)^2}$
C) 1 ◆
D) 0

4) The slope of the tangent to the curve $y = x^3 + 5$ at the point (1, 2) is

A) 6
B) 2
C) 5
D) 3 ◆

5) If a particle thrown vertically upward move according to the law, $x = 32t - 16\ t^2$ (x in ft, t in sec) then the height attained by the particle when the velocity is zero is

A) 0
B) 32t
C) 16ft ◆
D) 2ft

6) If a particle moves according to the law $x = 16t - 4$ then acceleration at time t = 20 is

A) 6
B) 0 ◆
C) 116
D) 4

7) If a particle moves according to the law $x = e^t$ then velocity at time t = 0 is

A) 0
B) 1 ◆
C) e
D) none of these

8) If $x = 2t$, $y = t^2$ then $\dfrac{dy}{dx}$ is equal to

A) 4t
B) 2
C) t ◆
D) 4

9) The derivative of sin(x) w.r.t x is

A) cos (x) ◆
B) – cos (x)
C) cos (a – b)
D) 0

10) The derivative of x sina w.r.t x is

A) cos a
B) x cos a + sin a
C) – x cos a + sin a
D) sin a ◆

11) The derivative of $\frac{x+a}{\sin a}$ w.r.t x is

A) $\frac{\sin a-(x+a)\cos a}{(\sin a)^2}$
B) $\frac{\sin a-\cos a}{\sin^2 a}$
C) $\frac{\sin a-x-a}{\sin^2 a}$
D) $\frac{1}{\sin a}$ ◆

12) The derivative of $\frac{\sin a}{\cos a}$ w.r.t x is

A) $\sec^2(ax+b)$
B) $\frac{\cos a}{\sin a}$
C) $\frac{-\cos a}{\sin a}$
D) 0 ◆

13) The derivative of tan (ax + b) w.r.t tan (ax + b) is

A) $\sec^2(ax+b)$
B) $a\sec^2(ax+b)$ ◆
C) $b\sec^2(ax+b)$
D) 1

14) If x = 2cos$^7\theta$, y = 4sin$^7\theta$ then dy/dx is equal to

A) $4\tan^7\theta$

B) $-4\tan^7\theta$

C) $4\tan^5\theta$

D) $-2\tan^5\theta$ ◆

15) The derivative of (sec^{-1} x + cosec^{-1}x) is equal to

A) $\dfrac{1}{x\sqrt{x^2-1}}$

B) $\dfrac{1}{1+a^2}$

C) 0 ◆

D) $\dfrac{1}{\sqrt{x^2-1}}-\dfrac{1}{\sqrt{x^2+1}}$

16) The derivative of Sin^{-1}a + Tan^{-1} a w.r.t x is equal to

A) $\dfrac{1}{\sqrt{1-a^2}}$

B) $\dfrac{1}{1+a^2}$

C) $\dfrac{1}{\sqrt{1-a^2}}+\dfrac{1}{1+a^2}$

D) 0 ◆

17) The value of e as sum of the series is

A) $1+\dfrac{1}{2}+\dfrac{1}{3}+\ldots\ldots$

B) $1+2+\dfrac{1}{3}+\ldots\ldots$

C) $1+\frac{1}{1!}+\frac{1}{2!}+\frac{1}{3!}......$ ◆

D) $1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}......$

18) The base of the natural logarithmic function is

A) 10

B) 2

C) e ◆

D) none of these

19) The natural exponential function is defined by the equation

A) $y = a^x$

B) $y = 2^x$

C) $y = e^x$ ◆

D) $y = 3^x$

20) The derivative of $\sin(\sin a)$ w.r.t x is

A) $\cos(\sin a)$

B) $\cos(sina)\cos a$ ◆

C) $\cos(\cos a)$

D) 0

21) If $a^y = x$ then the value of y is

A) ax

B) $\log_a x$ ◆

C) x/a

D) a/x

22) If $\frac{y}{x} = Tan^{-1}\frac{x}{y}$ then $\frac{dy}{dx}$ is

A) xy

B) $\frac{1}{x^2+y^2}$ ◆

C) $\frac{1}{1+y^2}$

D) $\frac{y}{x}$

23) The derivative of exp(sinx) is

A) exp (cosx)
B) sinx exp(cosx)
C) (cosx) exp (sinx) ◆
D) cosx exp (cosx)

24) The derivative of e^2 w.r.to x is

A) 2e
B) 2
C) 1
D) 0 ◆

25) The derivative of X^x is

A) X^{x-1}
B) $X.X^{x-1}$
C) X^x (1+ln x) ◆
D) X^x ln x

26) If δx or dx is quite small then the difference between dy and δy will be

A) very large
B) large
C) small
D) negligible ◆

27) If radius of a circular disc is unity then its area will be

A) $\pi\chi^2$
B) $2\pi\chi$
C) π ◆

D) 2π

28) The derivative of the function f(x) = sinx + sinx + …. up to 9 times, is

A) cosx + cosx + cosx
B) 9 cosx ◆
C) 9 sin x
D) 3 cos x

29) If $x = \cos^2\theta$, $y = 4\sin^2\theta$ then $\frac{dy}{dx}$ is

A) – 2
B) 2
C) – 4 ◆
D) 4

30) The derivative of the function $f(x) = \frac{1}{\operatorname{cosec} x}$ is

A) $\text{Sec}^2 45^\circ \text{Cosx}$
B) $\text{Sec}^2 45^\circ \text{Sinx}$
C) $-\text{Cosec}^2 45^\circ \text{Cotx}$
D) Cosx ◆

31) The derivative of the function y = tanx is

A) $\tan x \sec^2 45^\circ + \sec^2 x \tan 45^\circ$
B) $\sec^2 x \sec^2 45^\circ$
C) $\text{Sec}^2 45^\circ$
D) $\text{Sec}^2 x$ ◆

32) A particle thrown vertically upward, moves according to the law, $x = 32 - 16t^2$ (x in ft, t in sec) then the maximum height attained by the particle is

A) 32ft
B) 16ft ◆

C) 48ft
D) 2ft

33) If in a function $y = x^2 - 2x$, $x = 4$, increment in $x = 0.5$ then the value of differential of the dependent variable is
A) 4.5
B) 3.5 ◆
C) 3
D) 2.5

34) If $y = e^{2x}$ then y_9 is
A) e^{2x}
B) 2^9
C) $2^9 e^{2x}$ ◆
D) $2^8 e^{2x}$

35) In the interval $(-\infty, \infty)$ the function defined by the equation $y = x^3$ is
A) Increasing ◆
B) decreasing
C) constant
D) even

36) The origin for the function $y = x^3$ is a point of
A) Maxima
B) Minima
C) Inflexion ◆
D) Absolute Maxima

37) If $f'(c)$ exists then $f(c)$ is a maximum or minimum value of f, only if
A) $f'(c) > 0$
B) $f'(c) < 0$
C) $f'(c) = 0$ ◆

D) $f'(c) = 1$

39) If $f'(c) < 0$ for every $c \in (a, b)$ then f is
A) increasing ◆
B) decreasing
C) constant
D) zero

40) A function f will have a minimum value at
$x = a$, if $f'(a) = 0$ and $f''(a)$ is
A) + ve ◆
B) – ve
C) 0
D) ∞

41) The function $f(x) = x^2$ increases in the interval
A) [1, 5]
B) [- 1, 5]
C) [- 5, 1]
D) [-5, - 1] ◆

42) The function $f(x) = 1 - x^2$ increases in the interval
A) (- 5, 1)
B) (-5, 2)
C) (–5, 3)
D) (-5, -1) ◆

43) The function $f(x) = 1 - x^3$ decreases in the interval
A) (-1, 1)
B) (-2, 2)
C) (-3, 3)
D) All A, B and C are true ◆

44) In the interval (-2, 3) the function $f(x) = x^2$ is

A) increasing
B) decreasing
C) neither increasing nor decreasing
D) maximum ◆

45) The function f(x) = $\frac{2}{x}$ is decreasing in the interval

A) (0, 2)
B) (0, 3)
C) (0, 4)
D) All A, B, C are true ◆

46) The function f(x) = $x^3 - 1$ is increasing in the interval

A) (-5, -1) ◆
B) (-5, 1)
C) (-5, 5)
D) All A, B, C are true

47) The function f(x) = $1 - x^3$ has a point of inflexion at

A) origin
B) x = 2 ◆
C) x = - 1
D) x = 1

48) The function f(x) = $x^2 - 3x + 2$ has a minima at

A) x = 1
B) x = 3/2 ◆
C) x = 3
D) x = 2

49) The function $f(x) = \frac{x^3}{3} - \frac{3x^2}{2} + 2x$ has minima at

A) x = 0
B) x = 1 ◆

C) x = -1
D) x = 2

50) In the interval $(0, \frac{\pi}{2})$ the function

f(x) = cosx is ◆
A) increasing
B) decreasing
C) neither increasing nor decreasing
D) constant

51) The function $f(x) = 3x^2 - 4x + 5$ has a minima at
A) x = 2/3
B) x = 2
C) x = 3 ◆
D) x = - 2

52) The function $f(x) = 5x^2 - 6x + 2$ has a minima at
A) x = 3
B) x = 5
C) x = 3/5 ◆
D) x = - 3/5

53) In the interval (0, π) the function sinx has a maxima at the point
A) x = 0
B) x = π/2 ◆
C) x = π
D) x = π/4

54) In the interval (0, π) the function f(x) = sin x has a minimum value at the point
A) x = 0
B) x = π/2
C) x = π/4

D) x = π ◆

55) In the interval $[-\frac{\pi}{2},\frac{\pi}{2}]$ the function f(x) = cos x has a maxima at

A) x = π/2
B) x = - π/2
C) x = 0 ◆
D) x = π/4

56) The function f(x) = sin x decreases in the interval

A) $\left(0,\frac{\pi}{2}\right)$
B) $\left(\pi,\frac{3\pi}{2}\right)$
C) $\left(\frac{3\pi}{2},2\pi\right)$
D) None of these ◆

57) The function f(x) = cos x increases in the interval

A) $\left(0,\frac{\pi}{2}\right)$
B) $\left(\frac{\pi}{2},\pi\right)$
C) $\left(\frac{\pi}{2},\frac{2\pi}{3}\right)$
D) None of these ◆

58) The function f(x) = tan x increases in the interval

A) $\left(0,\dfrac{\pi}{2}\right)$

B) $\left(\dfrac{\pi}{2},\pi\right)$

C) $\left(\pi,\dfrac{3\pi}{2}\right)$

D) All A, B, C is true ◆

59) The function f(x) = cot x decreases in the interval

A) $\left(0,\dfrac{\pi}{2}\right)$

B) $\left(\dfrac{\pi}{2},\pi\right)$

C) $\left(\pi,\dfrac{3\pi}{2}\right)$

D) All A, B, C are true ◆

60) The function f(x) = sec x increases in the interval

A) $\left(\dfrac{\pi}{2},\pi\right)$

B) $\left(\pi,\dfrac{3\pi}{2}\right)$

C) $\left(\dfrac{3\pi}{2},2\pi\right)$

D) None of these ◆

61) The function f(x) = sec x decreases in the interval

A) $\left(0, \frac{\pi}{2}\right)$

B) $\left(\frac{\pi}{2}, \pi\right)$

C) $\left(\pi, \frac{3\pi}{2}\right)$ ◆

D) $\left(0, \frac{\pi}{3}\right)$

62) The function cosec x increases in the interval

A) $\left(0, \frac{\pi}{2}\right)$

B) $\left(\pi, \frac{3\pi}{2}\right)$ ◆

C) $\left(\frac{3\pi}{2}, 2\pi\right)$

D) $\left(0, \frac{\pi}{4}\right)$

63) The function cosec x decreases in the interval

A) $\left(\frac{\pi}{2}, \pi\right)$ ◆

B) $\left(\pi, \frac{3\pi}{2}\right)$

C) $\left(\frac{3\pi}{2}, 2\pi\right)$

D) $\left(\dfrac{\pi}{2}, \dfrac{2\pi}{3}\right)$

64) Two positive real numbers, whose sum is 40 and whose product is a maximum are

A) 30, 10
B) 25, 15
C) 20, 20 ◆
D) 19, 21

Unit 14: Vectors in Space

1) The triangle law for vector addition is equivalent to the

A) Commutative law
B) Associative law
C) Parallelogram law ◆
D) First law

2) The position vector of a point $P(x, y, z)$ is denoted by

A) $\overrightarrow{PQ}$
B) $\overrightarrow{OP}$ ◆
C) $\overline{P}$
D) $\overrightarrow{AP}$

3) If Cosα, Cosβ, Cosχ are the directions Cosines of a vector then

A) $\cos\alpha + \cos\beta + \cos\chi = 1$
B) $\cos^2\alpha + \cos^2\beta + \cos^2\chi = 0$
C) $\cos^2\alpha + \cos^2\beta + \cos^2\chi = 1$ ◆
D) $\cos\alpha + \cos\beta + \cos\chi = 0$

4) The numbers proportional to the direction cosines of a vector are called

A) Vector numbers
B) Scalar numbers
C) Direction numbers ◆
D) Rational numbers

5) Two or more vectors are said to be collinear if they are

A) perpendicular to the same line
B) parallel to the same line
C) intersecting the same line

D) not parallel to the same line ◆

6) Two or more vectors are said to be coplanar if they

A) are perpendicular to the same plane
B) are not parallel to the same plane
C) lie in the same plane ◆
D) do not lie in the same plane

7) The component of $\overline{a} = 3i + 4j$ in the direction of z-axis is

A) 3
B) 4
C) 0 ◆
D) 7

8) The unit vector in the direction of the vector $\overline{a} = i + j + k$ is

A) $\dfrac{\overline{a}}{3a}$
B) $\dfrac{\overline{a}}{3}$
C) $\dfrac{\overline{a}}{\sqrt{3}}$
D) None of these ◆

9) The vectors $\overline{a} = i + 2j + 3k$ and $\overline{b} = 2i + 4j + 6k$ are

A) Perpendicular
B) Parallel ◆
C) Not parallel
D) None of these

10) The join of the mid points of the consecutive sides of any quadrilateral is

A) a square

B) a rectangle
C) a parallelogram ◆
D) none of these

11) If A (1, 2, 3) and B (3, 4, 5) are two points then the mid pint of $\overline{AB}$ is
A) (4, 3, 5)
B) (4, 6, 8)
C) (4, 5, 6)
D) (2, 3, 4) ◆

12) The direction Cosines of $\bar{i}$ are
A) 0, 0, 1
B) 0, 1, 0
C) 1, 0, 0 ◆
D) 1, 1, 0

13) The direction cosines of the vector $\bar{a} = \bar{i} + \bar{j}$ are
A) 1, 1, 0
B) $\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 1$
C) $1, \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$
D) $\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0$ ◆

14) The Norm of the vector $\bar{a} = \bar{i} - \bar{j}$ is
A) 0
B) 2
C) $\sqrt{2}$ ◆
D) 1

15) If $\bar{a} = 3i + j - k$ and $\bar{b} = \lambda i - 4j + 4k$ are parallel then the value of λ is

A) 4
B) 8
C) 12
D) – 12 ◆

Products of Vectors

1) If $\overline{a}$ is a unit vector then the value of $\overline{a}.\overline{b}$ is

A) 1
B) $|\overline{a}|\cos\theta$
C) $|\overline{b}|\cos\theta$ ◆
D) 0

2) The projection of $\overline{a}$ in the direction of $\overline{b}$ is

A) $|\overline{b}|\cos\theta$
B) ab Cosθ
C) ab
D) $|\overline{a}|\cos\theta$ ◆

3) If $\overline{a} = i + j$ and $\overline{b} = i + k$ are two vectors then inner product of $\overline{a}$ and $\overline{b}$ are

A) 1 ◆
B) – 1
C) 0
D) 2

4) The inner product of $\overline{i}$ and $\overline{j}$ is

A) 1
B) – 1
C) 0 ◆
D) 2

5) If $l_1l_2 + m_1m_2 + n_1n_2 = 0$, then the angle between the two vectors is

A) 45^o
B) 60^o
C) 90^o ◆
D) 180^o

6) If the right bisectors of the two sides of a triangle pass through the origin, then the right bisector of the third side will pass through the point

A) (1, 1)
B) (1, 2)
C) (1, 3)
D) (0, 0) ◆

7) The equation 2x + 3y + 6z = 35 represents

A) a line
B) a circle
C) a plane ◆
D) a parabola

8) If $\overline{a}$ is the position vector of a given point (1,2,3) and $\overline{x}$ is the position vector of any point (x, y, z) such that $\left|\overline{x} - \overline{a}\right| = 2$ then the locus of $\overline{x}$ describes

A) a circle
B) an ellipse
C) a plane
D) a sphere ◆

9) The equation $(x - 1)^2 + (y - 3)^2 + (z - 5)^2 = 25$ represents

A) a circle
B) a sphere ◆
C) a plane

D) an ellipse

10) The coordinates of the center of the sphere $x^2 + y^2 + z^2 = 9$ is

A) (0, 0)
B) (3, 3, 0)
C) (0, 0, 0) ◆
D) (0, 0, 3)

11) If $\bar{a}$ is the position vector of a given point (1,1,1) and $\bar{\chi}$ is the position vector of any point (x, y, z) such that $\left|\bar{\chi} - \bar{a}\right| . \bar{a} = 0$, then the locus of $\bar{\chi}$ describes.

A) a sphere
B) a circle
C) an ellipse
D) a plane ◆

12 The distance from the origin to the plane

A) 7
B) 0
C) 1
D) None of these ◆

13) The octant in which the point coordinates are all positive is called

A) 1^{st} octant ◆
B) 2^{nd} octant
C) 4^{th} octant
D) 8^{th} octant

14) The point (3,5,8) lies in the

A) 3^{rd} octant
B) 5^{th} octant

C) 8^{th} octant
D) 1^{st} octant ◆

15) The three coordinate's planes divide all space in
A) 3 cells
B) 4 cells
C) 8 cells ◆
D) 6 cells

16) If $\overline{a} = i + 2j + k$, $\overline{b} = 3i + j - k$ and $\overline{c} = i + 2j + k$ are the co terminus edges of a parallelepiped then its volume is
A) 0 ◆
B) 8
C) 27
D) 1

17) If $\overline{a} = i + 2j + 3k$, $\overline{b} = 2i + 4j + 6k$ and $\overline{c} = 3i - j + k$ then the value of $\overline{a}.\overline{b}\times\overline{c}$ is
A) 28
B) 26
C) 0 ◆
D) 24

18) If volume of a parallelepiped with $\overline{a}, \overline{b}, \overline{c}$ as co-terminus edges is 24 the volume of the tetrahedron with the same edges is
A) 48
B) 12
C) 6
D) 4 ◆