Unit 2: Differentiation

1) Let f be a real value function and $x \in D_f$ 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, $x = 32t - 16t^2$ (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 $\frac{dy}{dx}$ is equal to
A) 4t
B) 2
C) t
D) 4

9) The derivative of sin (a + b) w.r.t x is
A) cos (a + b)
B) – cos (a + b)
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 xis

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 = $2\cos^7\theta$, y = $4\sin^7\theta$ 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) $\frac{1}{x\sqrt{x^2-1}}$
B) $\frac{1}{1+a^2}$
C) 0
D) $\frac{1}{\sqrt{x^2-1}}-\frac{1}{\sqrt{x^2+1}}$

16) The derivative of Sin^{-1}a + Tan^{-1} a w.r.t x is equal to

A) $\frac{1}{\sqrt{1-a^2}}$
B) $\frac{1}{1+a^2}$
C) $\frac{1}{\sqrt{1-a^2}}+\frac{1}{1+a^2}$
D) 0

17) The value of e as sum of the series is

A) $1+\frac{1}{2}+\frac{1}{3}+.....$
B) $1+2+\frac{1}{3}+.....$
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 (sina)
B) cos (sina) cosa
C) cos (cosa)
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 $f(x) = \frac{1}{\cos ecx}$ is

A) $Sec^2 45^o Cosx$
B) $Sec^2 45^o Sinx$
C) $-Cosec^2 45^o Cotx$
D) Cosx

31) The derivative of the function y = tanx is

A) $\tan x \sec^2 45^o + \sec^2 x \tan 45^o$
B) $\sec^2 x \sec^2 45^o$
C) $Sec^2 45^o$
D) $Sec^2 x$

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 $(0,\frac{p}{2})$ 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 $[-\frac{p}{2},\frac{p}{2}]$ 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) $\left(0,\frac{p}{2}\right)$
B) $\left(p,\frac{3p}{2}\right)$
C) $\left(\frac{3p}{2},2p\right)$
D) $\left(0,\frac{p}{2}\right)$

57) The function f(x) = cos x increases in the interval

A) $\left(0,\frac{p}{2}\right)$
B) $\left(\frac{p}{2},p\right)$
C) $\left(\frac{p}{2},\frac{2p}{3}\right)$
D) $\left(\frac{3p}{2},2p\right)$

58) The function f(x) = tan x increases in the interval

A) $\left(0,\frac{p}{2}\right)$
B) $\left(\frac{p}{2},p\right)$
C) $\left(p,\frac{3p}{2}\right)$
D) All A, B, C is true

59) The function f(x) = cot x decreases in the interval

A) $\left(0, \frac{p}{2}\right)$
B) $\left(\frac{p}{2}, p\right)$
C) $\left(p, \frac{3p}{2}\right)$
D) All A, B, C are true

60) The function f(x) = sec x increases in the interval

A) $\left(\frac{p}{2}, p\right)$
B) $\left(p, \frac{3p}{2}\right)$
C) $\left(\frac{3p}{2}, 2p\right)$
D) $\left(p, \frac{5p}{4}\right)$

61) The function f(x) = sec x decreases in the interval

A) $\left(0, \frac{p}{2}\right)$
B) $\left(\frac{p}{2}, p\right)$
C) $\left(p, \frac{3p}{2}\right)$
D) $\left(0, \frac{p}{3}\right)$

62) The function cosec x increases in the interval

A) $\left(0, \frac{p}{2}\right)$
B) $\left(p, \frac{3p}{2}\right)$
C) $\left(\frac{3p}{2}, 2p\right)$
D) $\left(0, \frac{p}{4}\right)$

63) The function cosec x decreases in the interval

A) $\left(\frac{p}{2}, p\right)$
B) $\left(p, \frac{3p}{2}\right)$
C) $\left(\frac{3p}{2}, 2p\right)$
D) $\left(\frac{p}{2}, \frac{2p}{3}\right)$

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

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