



# COMSATS University Islamabad

Attock Campus



## Department of Mathematics

### Assignment # 03

**Class:** BSM-IV  
**Subject:** Set Topology  
**Instructor:** Dr. Atiq ur Rehman

**Due Date:** 30-04-2025  
**Course Code:** MTH251  
**Marks:** 25

Name: \_\_\_\_\_

Reg: \_\_\_\_\_-BSM-\_\_\_\_\_

**Question # 1:** Define base for a topological space and give an example.

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**Question # 2:** Define subbase. Let  $X = \{a, b, c, d, e\}$  be a set. Assume  $X = \{a, b, c, d\}$  and  $\mathcal{A} = \{\{a\}, \{b, c\}, \{c, d\}\}$  be class of subset of  $X$ . Construct a base for topology on  $X$  by using  $\mathcal{A}$  and then write that topology.

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**Question # 3:** Let  $\mathcal{B}$  be a base for a topology  $\tau$  on  $X$  and let  $\mathcal{B}^*$  be a class of open sets containing  $\mathcal{B}$ . Show that  $\mathcal{B}^*$  is also a base for  $\tau$ .

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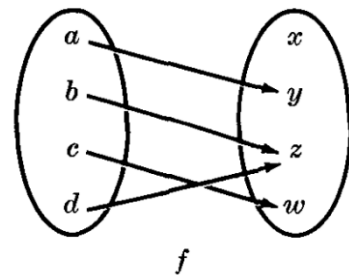
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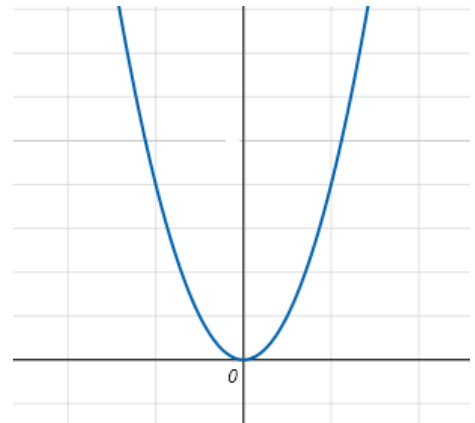
**Question # 4:** Let  $X = \{a, b, c, d\}$  and  $Y = \{x, y, z, w\}$  and  $f: X \rightarrow Y$  be a function defined in the given diagram. Then write

- (i)  $f[\{a, d\}] = \dots\dots\dots$
- (ii)  $f[\{b, d\}] = \dots\dots\dots$
- (iii)  $f^{-1}[\{x\}] = \dots\dots\dots$
- (iv)  $f^{-1}[\{x, z, w\}] = \dots\dots\dots$



**Question # 5:** Let  $g: \mathbb{R} \rightarrow \mathbb{R}$  be a function defined as  $g(x) = x^2$ . Then write

- (i)  $g(-2) = \dots\dots\dots$
- (ii)  $g(\pi) = \dots\dots\dots$
- (iii)  $g[\{-1, 2\}] = \dots\dots\dots$
- (iv)  $g[\{-2, 2\}] = \dots\dots\dots$
- (v)  $g[(1, 2)] = \dots\dots\dots$
- (vi)  $g[(-5, 2)] = \dots\dots\dots$
- (vii)  $g[-1, 2] = \dots\dots\dots$
- (viii)  $g^{-1}(4) = \dots\dots\dots$
- (ix)  $g^{-1}[\{4\}] = \dots\dots\dots$
- (x)  $g^{-1}[\{-2\}] = \dots\dots\dots$
- (xi)  $g^{-1}[\{0, 2, 4, 9\}] = \dots\dots\dots$
- (xii)  $g^{-1}[(0, 4)] = \dots\dots\dots$
- (xiv)  $g^{-1}[(-2, -1)] = \dots\dots\dots$



- (xiii)  $g^{-1}[(1, 5)] = \dots\dots\dots$
- (xv)  $g^{-1}[0, 25] = \dots\dots\dots$