



# COMSATS University Islamabad

Attock Campus

## Department of Mathematics

### Assignment # 03

**Class:** BSM-VIII  
**Subject:** Convex Analysis  
**Instructor:** Dr. Atiq ur Rehman

**Due Date:** 5-5-2025 (11:30AM)  
**Course Code:** MTH424  
**Marks:** 20

#### Note:

- Submit hardcopy or you may send PDF at [atiq+mth424@cuiatk.edu.pk](mailto:atiq+mth424@cuiatk.edu.pk) having name "sp25-mth424-a03-xyz.pdf" where xyz is last three digits of your registration number.

#### Question # 1

Please include the following statement, followed by your signature:

*I affirm that I have completed this assignment independently, without collaboration or sharing of information with any other classmate.*

#### Question # 2

Prove that if  $f: I \rightarrow \mathbb{R}$  is strictly convex, then  $f'_-$  and  $f'_+$  exist and are strictly increasing on  $I^\circ$ .

#### Question # 3

Prove that if  $f$  is differentiable and increasing (decreasing) on  $I$ , then  $f'(x) \geq (\leq) 0$  for all  $x \in I$ .

#### Question # 4

Prove that if  $f$  is differentiable and convex on  $I$ , then  $f'$  is increasing and if  $f$  is twice differentiable and convex on  $I$  then  $f''(x) \geq 0$  for all  $x \in I$ .

