



COMSATS University Islamabad, Islamabad Campus

Mid Term Exam

Course Title:	Multivariable Calculus	Course Code:	MTH105	Credit Hours:	3(3,0)
Course Instructor/s:	Dr. M. Bilal Ashraf	Program Name:			
Semester:	Batch:	Section:	Date:		
Time Allowed:	90 mins	Maximum Marks:	30		
Student's Name:	Reg. No.				
Student's Signature	Marks Obtained				

Question # 1:

- (a) Find the derivative of $f(x, y, z) = x^3 - xy^2 - z$ at $P_0(1, 1, 0)$ in the direction of $\vec{v} = 2\hat{i} - 3\hat{j} + 6\hat{k}$. 4/7.
- (b) In what directions does f change most rapidly at $P_0(1, 1, 0)$, and what are the rates of change in these directions? 3, -3.

Question # 2: Find parametric equations for the line tangent to the curve of intersection of the surfaces

$x^2 + y^2 = 5$, $x^2 + y^2 - z = 0$ at the point $(\sqrt{2}, \sqrt{2}, 4)$ $x = \sqrt{2} - 2\sqrt{2}t$, $y = \sqrt{2} + 2\sqrt{2}t$, $z = 4$

Question # 3: Find the absolute maxima and minima of the function on the given domain $f(x, y) = x^2 + xy + y^2 - 6x + 2$ on the rectangular plate $0 \leq x \leq 5, -3 \leq y \leq 0$.

$f(0, -3) \rightarrow \text{max}$
 $f(5, -2) \rightarrow \text{min}$