

Name: _____

TA (circle one): Tom Kent Casi Pantea

March 3, 2005

Math 234
Shirin Malekpour
Exam Ib

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I	15 Points	
II	15 Points	
III	15 Points	
IV	15 Points	
V	20 Points	
VI	20 Points	
Total	100 Points	

WRITE YOUR NAME AND CIRCLE YOUR TA'S NAME ON EVERY ANSWER SHEET. SHOW YOUR REASONING. YOU NEED TO SHOW WORK TO GET FULL CREDIT. NO CALCULATORS ARE ALLOWED. LEAVE YOUR ANSWERS IN FORM OF $\sqrt{2} + \pi^3$, $\ln(2)$, ETC.

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I. (15 points.) Evaluate $\lim_{(x,y) \rightarrow (0,0)} \frac{3x+y}{x-y}$ or show that the limit does not exist.

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II. (15 points.) Find the equation of the tangent plane to the surface $2x^2 - 2y^2 + 3z^2 - 10 = 0$ at point $(12, 17, 10)$.

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III. (15 points.) If $F(x, y, z) = \frac{3xy^3}{z^2}$ and $x = t^3 + 2$, $y = \sin 3t$ and $z = \ln 2t$, find $\frac{dF}{dt}$ in terms of x, y, z and t .

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IV. (15 points.) Find the extrema, if any, of the function $G(x, y) = 3x^3 + 2y^2 - 9x - 8y$. Classify the values.

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V. (20 points.) The derivative of $f(x, y, z)$ at a point \mathbf{P} is greatest in the direction of $\mathbf{u} = \frac{1}{\sqrt{3}}(1, -1, 1)$. We also have $D_{\mathbf{u}}f = 3\sqrt{3}$.

1. What is the angle between \mathbf{u} and $\nabla f(\mathbf{P})$?

2. Find $\nabla f(\mathbf{P})$.

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VI. (20 points.) A rectangular box whose edges are parallel to the coordinate axes is inscribed in the ellipsoid $4x^2 + 36y^2 + 9z^2 - 36 = 0$. What is the largest possible area of such rectangle? (Feel free to use the back of this paper if needed.)