Math 250B Test One
Section X01

Time: 50 Minutes
Total: 23 Marks

Name:_____

1. [5 marks] Find all the critical points for the following function.
Give your answer(s) in the form (x, y).
$z = 6x^4 - 16x^3 + 12x^2 + 3y^4 + 4y^3$

2. [4 marks] Use the Multivariable Chain Rule to find z_b at $(a, b) = (1, 1)$ given:
$z = 2s^2 - 3st + 4t^2, \quad s = 2a^2 - 3b^2, \quad t = a^2 + b^2.$

3. [4 marks] Find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ given:

$f = 5\ln(x^3 - y^4) + 2e^{xy} + 3\sin(x^3y^3) - 4\cos(9x - 8y)$

4. [5 marks] Find the equation of the tangent plane to
$z = \sqrt{50 - x^2 - y^2}$ at the point on the surface where $x = 3$ and $y = -4$.

5. [5 marks] Let $f = \dfrac{3(\sqrt{x})}{y^4}$.

The maximum relative error in x is $\pm 4\%$.
The maximum relative error in y is $\pm 7\%$.
Estimate the maximum relative error in f.