

Math 250B Test One
Section X02

Time: 50 Minutes
Total: 25 Marks

Name: _____

1. [3 marks] State whether the surface is a cone, cylinder, paraboloid, plane or sphere:

a) $x^2 + z^2 = 16$

b) $z^2 = 6 - x^2 - y^2$

c) $z = 6 - x^2 - y^2$

2. [5 marks] Find the equation of the tangent plane to $z = 6x^4 - 2x^3 + y^2 - 7y$ at the point $(x, y, z) = (1, -1, 12)$.

3. [6 marks] Use the Multivariable Chain Rule to find w_b at $(a, b) = (0, 0)$ given:

$$w = e^{xy} + \ln(x^2y + 1), \quad x = 2 + \sin(4a + 5b), \quad y = 2 + \cos(\pi - a - 6b).$$

4. [5 marks] Let $f = \frac{7(\sqrt{x})}{y^3}$

The maximum relative error in x is $\pm 2\%$.

The maximum relative error in y is $\pm 5\%$.

Estimate the maximum relative error in f .

5. [6 marks] Find the absolute maximum of $z = x^6 y^2$ over the region $x^2 + y^2 \leq 4$. Give the absolute maximum value and all points (x, y) where it is achieved.