

Math 250B Test One  
Section X01

Time: 50 Minutes  
Total: 20 Marks

Name: \_\_\_\_\_

1. [5 marks] Find the equation of the tangent plane to  $z = \frac{5}{4}e^{3xy} + 8y \cos(3x) + \pi$  at the point  $(x, y) = (0, -2)$ .

2. [4 marks] Use differentials to approximate  $f(a + 0.4, b - 0.3)$  given  $f(x, y) = 3(\sqrt{x} + \sqrt{y})^2$  and  $f(a, b) = c$ . Your answer will involve  $a, b$ , and  $c$ .

3. [5 marks] Use the Multivariable Chain Rule to find  $z_b$  evaluated at  $(a, b) = (2, 3)$  given:

$$z = 3x^3 - 2x^2y^3 + 7y^2 + \frac{3b^2}{a}, \quad x = a^2 - b^2, \quad y = ab.$$

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