NAME:

PRACTICE TEST 2 FOR MATH 2551 F1-F4, OCTOBER 31, 2018

This test should be taken without any notes and calculators. Time: 50 minutes. Show your work, otherwise credit cannot be given.

Problem 1: Sketch the level curve at height $c = 1$ for the function

$$f(x, y, z) = z(x^2 + y^2)^{-1/2} \ .$$

Problem 2: Find the unit vector in the direction in which f increases most rapidly at P

$$f(x, y) = y^2 e^{2x} \ , \quad P : (0, 1) \ .$$

Problem 3: Find an equation for the plane tangent to the graph of the function $f(x, y) = (x^2 + y^2)^2$ at the point $(1, 1, 4)$.

Problem 4: Find the absolute extreme values taken by the function f on the domain R

$$f(x, y) = (x - 3)^2 + y^2 \ , \ R : 0 \leq x \leq 4 \ , x^2 \leq y \leq 4x \ .$$

Problem 5: Find the points on the sphere $x^2 + y^2 + z^2 = 1$ that are closest and farthest away from the point $(2, 1, 2)$.

Problem 6: Find the volume of the intersection of the ball of radius R centered at the origin and the cylinder $(x - \frac{R}{2})^2 + y^2 = \frac{R^2}{4}$.

Problem 7: Find the area of the region bounded by $x = y^{1/2}$ and by $x = y^4$.

Problem 8: Compute the integral $\int \int_R (x^4 - 2y) dA$ where $R = \{(x, y) : -1 \leq x \leq 1 \ , \ -x^2 \leq y \leq x^2\}$.