This exam is worth 100 points and has 5 questions.

Show all work and simplify your answers! Answers with no justification will receive no points unless otherwise noted.

Please begin each problem on a new page.

**DO NOT** leave the exam until you have satisfactorily scanned and uploaded your exam to Gradescope.

You are taking this exam in a proctored and honor code enforced environment. **NO** calculators, cell phones, or other electronic devices or the internet are permitted. You are allowed one 8.5" 11" crib sheet with writing on one side.

- 0. At the top of the first page that you will be scanning and uploading to Gradescope, write the following statement and sign your name to it: "I will abide by the CU Boulder Honor Code on this exam." FAILURE TO INCLUDE THIS STATEMENT AND YOUR SIGNATURE MAY RESULT IN A PENALTY.
- 1. [2350/101922 (10 pts)] Write the word TRUE or FALSE as appropriate. No work need be shown. No partial credit given.

  - (a) The tangent plane to the surface  $z = x^2 + 2xy + 2y^2$  or x + 0y at the point (1.1) (b) There is no real value of k that makes the function  $f(x, y) = \begin{cases} \frac{2x^2y}{x^3 + y^3} & (x, y) \notin (0, 0) \\ k & (x, y) = (0, 0) \end{cases}$  continuous on its domain.
  - (c) If  $f(x, y) = e^{x^2 + 3y}$ ,  $x = \frac{p}{2} \cos u \sin 2y$ ,  $y = \frac{p}{2} \sin 4u \cos v$ , then  $\frac{@f}{@u} = 10e$  when  $u = v = \frac{1}{4}$ .
  - (d) The curve in the xy-plane corresponding to all points on the surface  $f(x; y) = x^2 2x + 4y^2 + 4$  that are 19 units above the xy-plane is a hyperbola.
  - (e) The instantaneous rate of change of z with respect to y at the point (1:0:1), where  $xz^3 + y^2 \ln z + e^x \cos y + 3xyz = 1$ , is 1.
- 2. [2350/101922 (21 pts)] The centripetal acceleration (m/s<sup>2</sup>) of a particle moving in a circle is  $a(r; v) = v^2 = r$ , where v is the velocity (m/s) and r is the radius (m) of the circle.
  - (a) (10 pts) Suppose you measure the radius to be roughly 2