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 $z = x^2 + 2xy + 2y^2$ ox + by at the point.

 (b) There is no real value of k that makes the function $f(x,y) = \begin{cases} \frac{2x^2y}{x^3 + y^3} & (x,y) \neq (0,0) \\ k & (x,y) = (0,0) \end{cases}$ continuous on its domain.
 - (c) If $f(x;y) = e^{x^2+3y}$, $x = \sqrt[D]{2}\cos u\sin 2v$; $y = \sqrt[D]{2}\sin 4u\cos v$, 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/s²) 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