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.

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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 $z = x^2 + 2xy + 2y^2 \quad 6x + 8y$ at the point $(10; \quad 7)$ is horizontal.

   (b) There is no real value of k that makes the function $f(x;y) = \begin{cases} \dfrac{2x^2y}{x^3+y^3} & (x;y) \neq (0;0) \\ k & (x;y) = (0;0) \end{cases}$ continuous on its domain.

   (c) If $f(x;y) = e^{x^2+3y}$, $x = \frac{p}{2}\cos u \sin 2v; y = \frac{p}{2}\sin 4u \cos v$, then $\frac{@f}{@u} = 10e$ when $u = v = \frac{}{4}$.

   (d) The curve in the xy-plane corresponding to all points on the surface $f(x;y) = x^2 \quad 2x + 4y^2 + 4$ 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 $xz^3 + y^2 \ln z + e^x \quad \cos y + 3xyz = 1$, is 1.

2. [2350/101922 (21 pts)] The centripetal acceleration (m/s^2) 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