This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of notes.

Graphing calculators are not allowed.

In order to receive credit, you must show your work. Explain why your answers are correct.

If you use a trial and error (or guess and check) method when a calculus method is available, you will not receive full credit.

Place a box around **YOUR FINAL ANSWER** to each question.

If you need more room, use the backs of the pages and indicate to the reader that you have done so.

Raise your hand if you have a question.
(16 points) Evaluate the following double integrals.

(a) (8 points) \[ \int_{R} \frac{x}{1 + xy} \, dA, \quad R = [0, 1] \times [0, 2] \]

(b) (8 points) \[ \int_{D} xy^2 \, dA, \quad D \text{ is the triangle with vertices } (0, 0), (0, 2) \text{ and } (1, 2). \]
(9 points) Let \( f(x, y) = x^2 - y^2 + 4 \ln(xy) \). Find all points on the surface where the tangent plane is parallel to the plane \( 6x = 2y + z \).
3 (8 points) Compute the equation of the tangent line to the curve $r = 1 + 2 \sin \theta$ at the point where $\theta = \pi/6$. Give your answer in exact form.

4 (8 points) Let $r(t) = 3t \mathbf{i} + 3t^2 \mathbf{j} + 2t^3 \mathbf{k}$. Calculate the curvature at the time $t = -2$. 
Find the absolute maximum of the function \( f(x, y) = (2x - 1) \cos \left( \frac{\pi}{2} y \right) \) on the closed rectangular region with vertices (0, 1), (0, 4), (3, 1) and (3, 4).