

Preliminary Homework
Assigned Monday, November 4

Note: Preliminary homework is always graded credit or no credit. **You get full credit for completing the assignment, whether or not your answers are correct.** The purpose of preliminary homework is to start you thinking about the topic of the next class.

You may use your preliminary homework in activities with your classmates. You should be sure to think about these questions so you will be prepared.

Preliminary homework is always due at the *beginning* of class.

Assignment: The surface S is the graph of the function $f(x, y) = 3x^2y - y^2$.

1. Compute $\frac{\partial f}{\partial x}(1, 1)$ and $\frac{\partial f}{\partial y}(1, 1)$.
2. If γ_1 is the intersection of S with the plane $x = 1$, find an equation for the tangent line to γ_1 at $(1, 1, 2)$.
(You can do this either by parametrizing γ_1 , or by interpreting the partial derivatives of f as slopes.)
3. If γ_2 is the intersection of S with the plane $y = 1$, find an equation for the tangent line to γ_2 at $(1, 1, 2)$.
4. Find an equation for the plane containing the lines you found in parts 2 and 3.
5. In order for this plane to be tangent to S at $(1, 1, 2)$, what must you check? (Your answer should be an equation stating that a certain limit equals zero. You do *not* have to check that this is true, just write down the equation.)