MATH 241 Spring, 2010 Quiz #6 Name:_____

For full credit you must show sufficient work that the method of obtaining your answer is clear. There is no need to "simplify" answers.

1. Let $z = f(x, y) = 2 + xy + 3x^2$, $\mathbf{a} = \langle 3, -4 \rangle$, and P be the point $(-1, 3)$.
   a. Compute the gradient of f.

   b. Compute the directional derivative of f at P in the direction of $\mathbf{a}$.

   c. What is the maximum value among all directional derivatives of f at P?

   d. Give an equation for the tangent plane to the surface $z = f(x, y)$ at the point $(-1, 3, f(-1, 3))$.

(over $\rightarrow$)

2. Consider $w = g(x, y, z) = x^2 z - y z^3$.

   a. The point Q $(1, -1, 2)$ is on which level surface for w (or g)?

   b. Determine an equation for the tangent plane to this surface at Q.