Name: _____

Quiz #6

In class. 25 minutes. No textbook or notes or calculator. 30 points total.

1. (*5 pts*)   Use the chain rule to find $\partial z/\partial s$:

$$z = \ln(x^2 + y^2), \quad x = s \ln t, \quad y = te^s$$

2. (*5 pts*)   Show that any function of the form $u = f(x - at)$ is a solution of the "one-way wave equation"

$$\frac{\partial u}{\partial t} + a\frac{\partial u}{\partial x} = 0$$

3. (*10 pts*) Use a tree diagram to write out the chain rule for the given case:

$$T = f(u, v, w), \quad u = u(x, y, z), \quad v = v(x, y, z), \quad w = w(x, y, z)$$

(*Both a correctly-labeled tree* and *the equations of the chain rule are required. Correct partial derivative notation is important.*)

4. Consider this function and point:

$$f(x, y, z) = x^2 yz - z^3, \qquad P(2, -1, 1)$$

(a) (*5 pts*) Find the gradient of f.

(b) (*5 pts*) Evaluate and simplify the gradient at P.