Math 1081, Quiz 3 Name: _____

1. Suppose the height of a ball thown out of a window (in feet above the ground after $t$ seconds) is given by

$$h(t) = -16t^2 + 48t + 64, \text{ for } 0 \leq t \leq t_f,$$

(where $t_f$ is the time at which the ball hits the ground, $h(t_f) = 0$).

(a) What is the initial height?

(b) What is the initial velocity?

(c) When does the ball reach its maximum height?

(d) What is the maximum height?

(e) When does the ball hit the ground?

(f) With what velocity does the ball hit the ground?

2. Some basic rules:

   (a) (product rule) if $f(x) = u(x)v(x)$, then $f'(x) =$

   (b) (quotient rule) if $f(x) = \dfrac{u(x)}{v(x)}$, then $f'(x) =$

   (c) (chain rule) if $h(x) = f(g(x))$, then $h'(x) =$

   (d) $\dfrac{d}{dx}a^x =$

   (e) $\dfrac{d}{dx}\log_a x =$

3. Find the following derivatives:

(a) $\dfrac{d}{dx}\dfrac{e^{3x}}{x^3+1}$

(b) $\dfrac{d}{dx}x^2\ln(3x-1)$

(c) $\dfrac{d}{dx}\sqrt[4]{4^x+x^4}$