Math 122B020F14 Quiz 3 October 8, 2014 Name: _____

1. Compute the following derivatives. If you use a differentiation rule, indicate which rule and what your component functions are (i.e. if you use the chain rule, indicate your inside and outside functions). Simplify your answers as much as possible.

(a) $f(x) = 3 \cdot 2^{\sqrt{x+1}}$

(b) $R(z) = \dfrac{z}{1 + e^{-z}}$

2. Suppose $f(2) = 1$, $g(1) = 3$, $f'(2) = -1$ and $g'(1) = 2$. Compute $\dfrac{d}{dx}[x \cdot g(f(x))]$ at $x = 2$

3. According to Einstein's general theory of relativity, an object's mass is not a constant: its mass depends on its velocity, according to the rule

$$m(v) = \frac{m_0}{\sqrt{1 - v^2/c^2}}$$

The constants m_0 and c are respectively the object's *rest mass* and the speed of light in a vacuum. Compute $\frac{dm}{dv}$ when $v = 0.25c$, and interpret your result.