Math 141: Quiz 7

1. Given: $f(x) = (2.5)^x$. Use the definition of the derivative and your calculator to estimate $f'(0)$ to two decimal places.

$$f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}, \text{ so...}$$

$$f'(0) = \lim_{h \to 0} \frac{f(0+h) - f(0)}{h} = \lim_{h \to 0} \frac{2.5^h - 2.5^0}{h}$$

$$= \lim_{h \to 0} \frac{2.5^h - 1}{h} \approx 0.92$$

2. Fuel consumption $c$ (measured in gallons per hour) of a car travelling at $v$ miles per hour is given by the function $c = f(v)$.

(a) What are the units on $f'(v)$?
   
   gallons per hr / mile per hr.

(b) What is the meaning of $f'(v)$?

   It is the rate of change in fuel consumption as the speed changes.

(c) Write a sentence that describes the meaning of the equation $f'(20) = -0.05$.

   When the car is travelling at 20 mph, the fuel consumption is dropping by .05 gallon per hour per mile per hour.

#2 WAS AN ODD NUMBERED HW PROBLEM!!!