MCV4U - Quiz 5.1-5.3 Name: _____

Mark: _____
16

1. Determine the derivative of the function $f(x) = (7^x)(x^7)$ in factored form. [2]

2. Determine the first and second derivative of the function $f(x) = e^{0.5x^2}$ in factored form. [3]

3. The number, N, of bacteria in a culture at time t in hours is $N = 1000\left[30 + e^{\frac{-t}{30}}\right]$.

A) What is the initial number of bacteria? [1]

B) How fast is the number of bacteria changing when t = 20? [3]

4. A certain radioactive substance decays exponentially over time. The amount of a sample of the substance that remains, P, after t years is given by $P(t) = 100e^{-4t}$, where P is expressed as a percentage. [5]

A) At what time has 50% of the substance decayed?

B) What is the rate of decay when 50% of the original sample has decayed?

5. Why can you not use the power rule for derivatives to differentiate $y = 2^x$? [2]