Chapter 5 mock test questions

October 29, 2016

1. Define the following terms:

   (a) Half-life
   (b) Doubling time
   (c) growth/decay rate
   (d) $\log_b(y)$.
   (e) Polynomial function
   (f) Rational function

2. Multiple choice:

   (I) $10\log_3(5) =$
       (a) $\log_3(15)$
       (b) $\log_3(5^{10})$
       (c) $\log_3(50)$
       (d) $\log_{30}(5)$

   (II) $\log_3(x) + \log_3(20) =$
       (a) $\log_3(x+20)$
       (b) $\log_3(20^x)$
       (c) $\log_3(20/x)$
       (d) $\log_3(20x)$

   (III) $3^{4\log_3(x)} =$
       (a) $4x$
       (b) x^4
       (c) $81x$
       (d) Cannot be reduced.

3. Find the equation of the line passing through the points $(1, 4)$ and $(-2, -9)$

4. Find the vertex of the parabola $y = -4x^2 + 12x + 40$ (Do it anyway you'd like.)

5. Solve for x (leave your answer in exact form. I.e., leave your answer in terms of logs, or radicals, etc.):

   (a) $13 = 10^{2x}$

   (b) $\log_5(3x + 1) = 2$

   (c) $\log_x(64) = 5$

   (d) $\log_5(x + 5) + \log_5(x + 2) = 2$

   (e) $3 \cdot 5^{2x} = 2^x$

   (f) $3 \log_2(x^{2/3}) = 4$

6. Suppose Fakium-123 is a radioactive isotope that has an exponential decay rate of 13% per year. Suppose you start with a sample of $150mg$ of Fakium-123.

   (a) Find a formula, $P(t)$, that tells you how much Fakium-123 you have after t many years. Hint, use the form $P(t) = P_0(1 - r)^t$.

   (b) How much Fakium-123 will remain after 13 years?

   (c) Find the half-life of Fakium-123.

   (d) Find the inverse of $P(t)$.

   (e) How long will it take until only $1/5^{th}$ of the original sample remains?

7. Suppose the population of a colony of deer is increasing exponentially. Suppose the deer population will double after 7 years.

   (a) Find a formula, $P(t)$ that tells you the population of the deer after t many years (Since you do not know the initial deer population, leave P_0 in your equation).

   (b) What is the growth rate of the deer population (hint: Use a calculator for this part. Express the function in the form $P(t) = P_0(1 + r)^t$).

   (c) How long will it take for the population to triple?