Math 22 Section 9

Quiz 10 Practice Solutions

1. Solve for x:

   (a) (2 points) $3^{3x} = 27$

   $log_3(3^{3x}) = log_3 27$

   $3x = 3$

   $x = 1$

   (b) (3 points) $logx + log(x-3) = 1$

   $log(x^2 - 3x) = log10$

   $10^{log(x^2-3x)} = 10^{log10}$

   $x^2 - 3x = 10$

   $x^2 - 3x - 10 = 0$

   $(x-5)(x+2) = 0$

   $x = 5$ ($x = -2$ is not a solution because it is not in the domain of $logx$)

2. (2 points) Recall that population growth can be modeled using $p(t) = p_0 e^{rt}$ where r is the relative rate of growth and p_0 is the initial population. If the population of a culture of bacteria triples every 2 hours, find the corresponding relative rate of growth r.

   $p(2) = 3p_0 = p_0 e^{r2}$

   $3 = e^{r2}$

   $ln3 = 2r$

   $r = \frac{ln3}{2}$

3. (2 points) The mass (in grams) of a sample of thorium-234 remaining after t days is given by $m(t) = 40e^{-.0277t}$. After how many days will there be only 20 grams left?

$20 = m(t) = 40e^{-.0277t}$

$\frac{1}{2} = e^{-.0277t}$

$-ln2 = -.0277t$

$t = \frac{ln2}{.0277}$