Math 12 – Workshop #25

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1. In complete sentences how is each of the following graphs related to the graph of $f(x) = 2^x$?

   (a) $g(x) = 2^{(x-2)}$ (b) $h(x) = 2^x - 2$ (c) $j(x) = \left(\frac{1}{2}\right)^x$

2. The population of a certain species of deer decreases by 10 percent every year. If we start with 1,000 deer how many are left after

   (a) 1 year (b) 2 years (c) 3 years (d) x years

3. A distant relative of yours had three bank accounts

   - Account 1: started 225 years ago with a single dollar at 1% annual interest.
   - Account 2: started 150 years ago with a 500 dollars at 1% annual interest.
   - Account 3: started 150 years ago with a single dollar at 10% annual interest.

   You can only inherit one of the three accounts.

   (a) Without doing any calculations which account would you pick?

   (b) The formula for the amount of money in an account with annual interest after t years is given by:

   $$P(t) = P_0(1 + r)^t$$

   where P_0 is the initial amount in the account, and r is the interest rate. How much money is in each account today?

4. The weight (in milligrams) of bacteria in a petri dish after t days is modelled by

   $$B(t) = \frac{45}{1 + 100e^{-t}}$$

   (a) How many milligrams of bacteria was initially in the petri dish?

   (b) Compute the number of milligrams in the dish after:

   i. 1 day ii. 10 days iii. 20 days iv. 100 days

   (c) What do you think is the is maximum weight of bacteria the petri dish can support?

5. Write the following equations in logarithmic form

   (a) $3^3 = 27$ (b) $9^{-2} = \frac{1}{81}$

6. Write the following equations in exponential form

   (a) $\log_2\left(\frac{1}{16}\right) = -4$ (b) $\log_{\sqrt{3}}(3) = 2$

7. Find the value of x

(a) $\log_3(x) = \frac{3}{2}$

(b) $\log_{\sqrt{2}}\left(\sqrt{8}\right) = x$