Math 418: Worksheet 8

October 26, 2020

1. Joanna is doing an experiment. She's discovered that if she puts redbull in the water that her three amoebae are swimming in, they will reproduce so that every 2 hours the amount of amoebae quadruples. At 9PM Joanna has 48 amoebae.

    a) How many will Joanna have at 11PM?

    b) When did Joanna start running her experiment?

    c) Write a function $N(t)$ giving the number of amoebae present as a function of time in hours. Note that even though clocks will go back from t=12 to t=1, we'll call 1AM the next day $t = 13$.

    d) Check your function is correct by checking that $N(9) = 48$.

2. Suppose $p(x) = ab^x$ is an exponential function such that $p(2) = \frac{3}{16}$ and $p(-1) = 12$. Evaluate $p(1)$. What are the values for a and b?

3. Is there an exponential function passing through the points $(2, 18)$ and $\left(-2, \frac{2}{9}\right)$? If so find values for a and b to write the function in the form $f(x) = ab^x$.

4. Is there an exponential function passing through the points $\left(-2, \frac{-4}{9}\right)$ and $(1, -12)$? If so find values for a and b to write the function in the form $f(x) = ab^x$.

5. Is there an exponential function passing through the points $(-1, 8)$ and $(3, -4)$? Why or why not?

6. What are the domain and range of $f(x) = 3(2)^x$?

7. What are the domain and range of $g(x) = -8\left(\frac{1}{5}\right)^x$?

8. A general exponential function has the form $f(x) = a(b^{kx})$. An equivalent form is given by $f(x) = a(B^x)$. Given $f(x) = 3(2^{5x})$ and $g(x) = 2(3^{4x-2})$, write $f(x)$ and $g(x)$ in the form $a(B^x)$.

9. A rare radioactive isotope has a half-life of 24 days. If Dr. Quark has a sample of the isotope that initially masses 18kg, how long will it take before Dr. Neutral only has 4.5grams left?

10. Solve $5^x = 125$

11. Solve $25^x = \frac{1}{5}$

12. Solve $9^x + 3^x - 6 = 0$.

13. Solve $32 = 16^x$