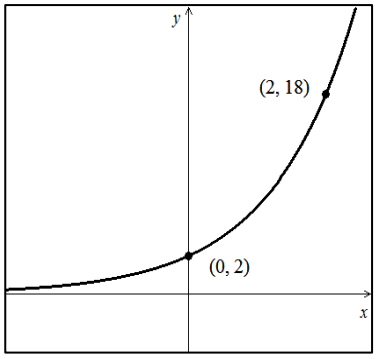
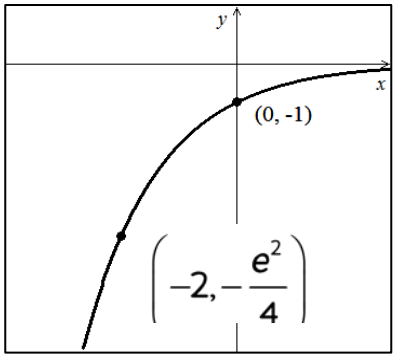
Name _____ Date _____ Period _____

3.1 Exponential & Logistic Functions Homework

Problems 1 – 4, determine the exact value of the function without using a calculator.

1. $f(x) = 5 \cdot 4^x$ for $x = -1$	2. $g(x) = -3 \cdot 2^x$ for $x = 5$
3. $h(x) = 6\left(\frac{1}{2}\right)^x$ for $x = 3$	4. $f(x) = -2 \cdot 5^x$ for $x = -2$

Problems 5 – 6, write an exponential function that describes each graph.

5. 	6. 

Problems 7 – 10, describe the transformation of the graph of $f(x)$ into the graph of $g(x)$.

7. $f(x) = 2^x$; $g(x) = 2^{x-4}$	8. $f(x) = \left(\frac{1}{2}\right)^x$; $g(x) = 3\left(\frac{1}{2}\right)^{-2x}$
9. $f(x) = e^x$; $g(x) = \left(\frac{1}{3}\right)e^{x+2}$	10. $f(x) = e^x$; $g(x) = 4e^{2x} - 3$

Problems 11 – 12, use a graphing utility to graph each function. Find the y-intercept, describe the end behavior using limits.

11. $f(x)=\dfrac{14}{1+3(0.5)^x}$	12. $g(x)=\dfrac{7}{1+2e^{-x}}$

Problems 13 – 14, graph the function and analyze completely.

13. $f(x)=4\left(e^{2x}\right)$ Domain: Range: Continuity: Increase/decrease: Symmetry: Boundedness: Extrema: Asymptotes: End behavior:	14. $g(x)=3(0.5)^x$ Domain: Range: Continuity: Increase/decrease: Symmetry: Boundedness: Extrema: Asymptotes: End behavior:

Problems 15 – 21, solve.

15. Bacteria is being grown in a petri dish. The number of bacteria B after t hours can be modeled by $B(t)=150e^{0.585t}$.

A. What is the initial number of bacteria present?

B. How many bacteria will be in the petri dish after 12 hours?

16. An archaeologist found that an artifact contained 18 grams of radioactive material. The decay model $A(t) = 18e^{-0.000122t}$ shows the amount of the radioactive matter, in grams, after t years. How many grams will be present after 5500 years?

17. The logistic growth function describes the population $P(t)$ of an endangered species of turtles t years after being introduced into a safe habitat area. $P(t) = \dfrac{263}{1 + 3.62e^{-0.144t}}$.

A. How many turtles were initially placed into the new area?

B. How many turtles are expected to be in the habitat after 10 years?

C. What is the limiting size of the habitat that will sustain this population of turtles?

18. Fruit flies are laying eggs on a rotten grapefruit. Suppose that the population $P(t)$ after t days is modeled by $P(t) = \dfrac{240}{1 + 18.6e^{-0.38t}}$.

A. What is the carrying capacity of the grapefruit?

B. How many fruit flies were initially on the grapefruit?

C. When will the population of fruit flies be 150?