Unit 2A

Quiz Review 2.1 – 2.5

Name ____

Date ____________________________ Period _________

Problems 1 – 6, use properties of arithmetic and geometric sequences.

1. Find the first five terms: $a_n = (-1)^n\,(2n + 5)$

2. Find a_n for the arithmetic sequence with $a_1 = 5, d = -4$, and $n = 98$.

3. Write the explicit formula for the sequence and generate the first five terms. $a_1 = 144\,, r = \frac{1}{2}$

4. Given the geometric sequence where $\{78.125, 31.25, 12.5, 5, \ldots, 0.128\}$. Write an exponential function that will contain the domain of the sequence.

5. Jason deposited \$2000 at the beginning of the year into an account that pays 5.5% interest compounded monthly. Write a general formula that will calculate the balance each month. When will the account reach \$5000?

6. A culture contains 4,200 bacteria initially and increases by 8.5% every hour. Find a formula for the number $N(t)$ for the number of bacteria present after t hours. How many bacteria will be present after 12 hours?

Problems 7-10, determine whether the equation/table of values represent exponential growth, exponential decay, or neither. Explain.

7. $f(x) = 138(0.75)^x$

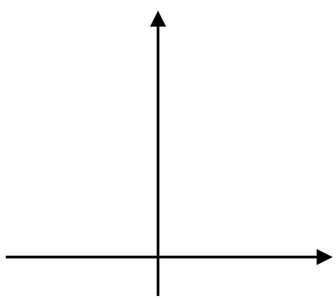
8. $y = 15(2 - x)^3$

9. $g(x) = 1248(1.05)^x$

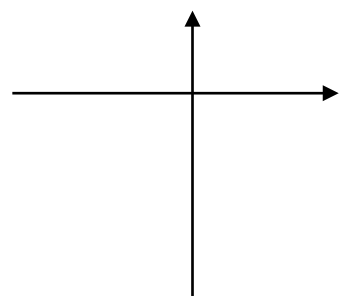
10. $g(x) = -3(1.016)^{\frac{1}{x}}$

Problems 11-12, graph and analyze the function. Label intercept(s), asymptotes, end-behavior.

11. $f(x) = 2e^{-x}$

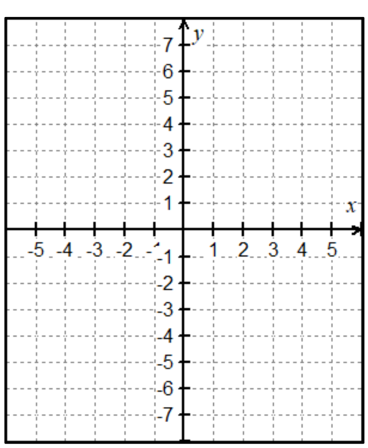


12. $g(x) = -3\left(\frac{1}{2}\right)^{-x}$

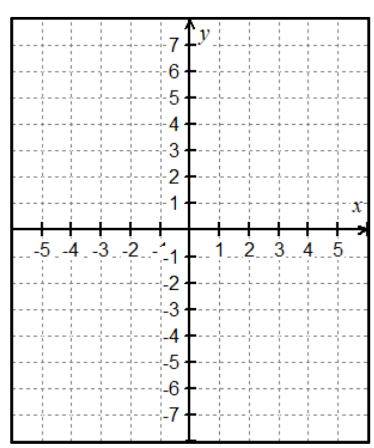


Problems 13 – 14, Show that the function $f(x) = b^{x+k}$ can be algebraically rewritten in the form of $h(x) = ab^x$, where $a = b^k$. Then, graph and analyze.

13. $f(x) = 2^{x+2}$



14. $f(x) = -\left(\frac{1}{2}\right)^{-(x+3)}$



Problems 15-17, use the regression feature of your calculator to model behavior.

15. A radioactive substance is measured over a 5-week period by a nuclear laboratory. The table below shows the amount of material at the end of the week, beginning with the initial sample of 125-grams.

Radioactive Substance	
Week	**Weight (in grams)**
0	125.0
1	105.4
2	86.2
3	72.3
4	59.7
5	49.4

A. Find an exponential function to model the data.

B. How much radioactive material will be left after 15 weeks?

16. The table below shows the degrees above room temperature for a pan of lasagna after t minutes of cooling.

Time (min)	0	5	10	15	20	25	30
°F **Above Room Temperature**	425	418	396	372	345	320	286

A. Find an exponential function to model the data.

B. What is the rate the pan of lasagna is cooling?

17. Bacteria is being grown in a petri dish. The number of bacteria B after t hours can be modeled by $B(t) = 280e^{0.675t}$.

A. What is the initial number of bacteria present? What is the rate of growth?

B. How many bacteria will be in the petri dish after 24 hours?

18. After 50 deer were introduced to a large wooded area, the population of deer in the wooded area can be modeled by the exponential function $D(t) = a \cdot b^t$, where t represents the number of years since deer were first introduced to the wooded area. The population of deer increases by 13% each year.

A. Find the values of *a* and *b*, and use these values to write an expression for *D(t).*

B. According to the model found in part (a), what is the population of deer in the large wooded area after 6 years?

A. Find an equivalent expression for *D(t)* where *t* is measured in months (instead of years).

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19. It is known that *f(x)* is an exponential function and that it passes through the given points. Write an equation for each.

A. (8, 12) and (10, 6)

B. (3, 5) and (8, 40)

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20. Answer the questions for each exponential function:

A. $f(x) = \left(\frac{1}{5}\right)^x$

a. Is the function increasing or decreasing?

b. Is the function concave up or concave down?

c. Find $\lim_{x \to -\infty} f(x) =$

d. Find $\lim_{x \to \infty} f(x) =$

B. $f(x) = 3(4.5)^x$

a. Is the function increasing or decreasing?

b. Is the function concave up or concave down?

c. Find $\lim_{x \to -\infty} f(x) =$

d. Find $\lim_{x \to \infty} f(x) =$

C. $f(x) = -2(6)^x$

a. Is the function increasing or decreasing?

b. Is the function concave up or concave down?

c. Find $\lim_{x \to -\infty} f(x) =$

d. Find $\lim_{x \to \infty} f(x) =$

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21. For each function, write an equivalent representation in the form $f(x) = ab^x$.

A. $k(x) = 4(3)^{x+2}$

B. $g(x) = 9^{2x}$