Name:_____Period:____Date:_____

NON-CALCULATOR SECTION

Vocabulary: Define each word and give an example.

1. radioactive decay

2. common logarithm

Short Answer:

3. Explain how to determine if an exponential function is a growth or decay model.

4. Derive the change of base formula for logarithms.

5. Describe the domain and range of the natural logarithm function.

Review:

6. By the fundamental theorem of algebra, the function $f(x) = x^4 + 3x^3 - 3x^2 + 3x - 4$ has how many complex zeros? _____ Find all of the complex zeros.

7. Write a polynomial function, $f(x)$, with real coefficients in standard form that has zeros -2 and $1 + 2i$.

8. Find the inverse relation of $f(x) = 2\sqrt{x} + 3$.

Problems:
Be sure to show all work used to obtain your answer. Circle or box in the final answer.

9. Determine a formula for an exponential function that passes through the points $(0,2)$ and $(3,1)$.

9. Describe how to transform the graph of $f(x) = -4^{-x}$ into the graph of $g(x) = 2^{x}$.

10. Find the *y*-intercept and horizontal asymptotes of $f(x) = \dfrac{64}{5 + 3e^{-0.05x}}$.

11. Find the exponential function that satisfies the given conditions: Initial value = 24, increasing at a rate of 5.4% per day.

12. Evaluate the following logarithms.

A. $\log_2 32$ B. $\log_5 \dfrac{1}{25}$ C. $\log 10000$ D. $\ln \dfrac{1}{\sqrt[3]{e}}$

13. Rewrite the equations in exponential form.

a. $\log_3 x = 4$ b. $\ln \frac{x}{y} = -4$ c. $\log \frac{a}{b} = -2$

14. Solve the equations.

a. $3^{x-3} = 5$ b. $3\log_2 x + 1 = 7$ c. $\ln(3x+4) - \ln(2x+1) = 5$

15. Use the properties of logarithms to write the expression $3\log(x+8) - 2\log(x-5)$ as a single logarithm.

16. Describe the sequence of transformations used to graph the function $y = -\log_2(x+1) + 4$. Then graph the function. Fill in the characteristics of the graph.

Domain: _____

Range: _____

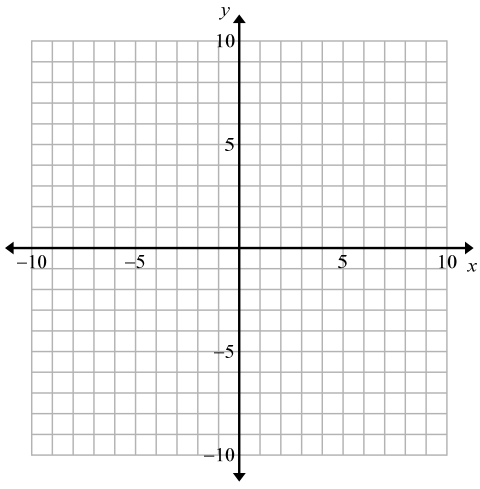
y-intercept(s): _____

x-intercept(s): _____

Asymptotes(s): _____

End Behaviors in Limit Notation: _____

_____



Name:_____Period:____Date:_____

CALCULATOR SECTION

17. Find the logistic function that satisfies the given conditions: Initial value = 12, limit to growth = 30, passing through $(2, 20)$.

18. Evaluate the following logarithms.
    a. $\log_3 13$ b. $\log_5 2$

19. Which expression is equivalent to $\ln \sqrt[5]{\frac{x}{10}}$? (Circle your answer.)

    A. $\frac{1}{5}\ln x - \ln 2$

    B. $\frac{\ln x}{5\ln 10}$

    C. $\frac{1}{5}\ln x - \frac{1}{5}\ln 10$

    D. $\frac{\ln 5}{\ln x - \ln 10}$

    E. $\frac{x}{10}\ln 5$

20. A single-cell amoeba doubles every 4 days. How long would it take one amoeba to produce a population of about 10,000 amoebae?

21. Find the amount *A* accumulated after investing a principal $P = \$4800$ for 17 years at an interest rate 6.2% compounded quarterly.

22. A casserole is removed from a $375^\circ F$ oven, and it cools to $200^\circ F$ after 15 minutes in a $75^\circ F$ room. How long (from the time it is taken out of the oven) does it take to cool to $100^\circ F$? (Use Newton's Law of Cooling: $T(t) = T_m + (T_0 - T_m)e^{-kt}$.)

23. The number *P* of students infected with flu at ATech *t* days after exposure is modeled by $P(t) = \dfrac{300}{1+e^{4-t}}$.

    a. What was the initial number of students infected with the flu?

    b. How many students were infected after 3 days?

    c. When will 100 students be infected?

    d. What would be the maximum number of students infected?