

Pre Calculus
Chapter 3 Review

Name: _____
Block: _____

No Calculator. Show all applicable work for full credit.

Describe how to transform the graph of $g(x) = 2^x$ or $h(x) = \log x$ into the graphs of $f(x)$ below. Sketch the graph by hand including 2 points and the asymptote.

1. $f(x) = 3^{-x}$

2. $f(x) = 2^{x-2} + 3$

3. $f(x) = -\log_4 x$

4. $f(x) = \log(1-x) - 3$

5. Identify each of the following for each function below: domain and range, intercept(s), the asymptote, and end behavior using limit notation.

a) $f(x) = 5\left(\frac{1}{2}\right)^x$

b) $g(x) = \log_3 x$

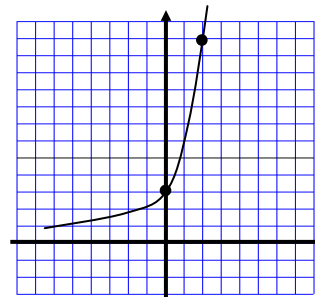
State whether the function is an exponential growth function or an exponential decay function.

6. $y = e^{4-x} + 2$

7. $y = 5\left(\frac{3}{2}\right)^x$

8. $y = 3^{-2x}$

9. Find the equation of the exponential function shown at right.



10. Find the logistic function of the form $f(x) = \frac{c}{1+ab^x}$ whose initial value is 12, limit to growth is 60, and passes through (1, 24).

11. Find the (a) y-intercept and (b) the horizontal asymptotes of the function.

$$f(x) = \frac{100}{1+3(2)^x}$$

Evaluate: Remember NO calculator.

12. $\log_{\frac{1}{81}} 3$

13. $\log_4 1$

14. $\ln e^4$

15. $\log \sqrt[5]{10}$

16. $5^{\log_5 12}$

17. $\log_{16} 64$

Graphing Calculator Allowed

For questions 18-20, choose the appropriate equation below and then solve. You should KNOW these for your test!!

$$y = ab^x$$

$$A = P \left(1 + \frac{r}{n} \right)^{(n \cdot t)}$$

$$A = Pe^{(r \cdot t)}$$

18. Sarah's salary as an account executive is growing at a rate of 5% per year. If her initial salary is \$36,000, how long will it take her salary to double? Solve algebraically and graphically.

19. Joe invests \$1200 into an account earning 3.5% interest compounded quarterly. How much is his investment worth after 5 years?

20. The number of bacteria in an experiment are growing daily at 1.5% compounded continuously. If there were 50 bacteria present when the experiment began, how many are present on the 20th day?

21. Use the TVM Solver: Find the payment made on the last day of each month for a 5 year \$15000 car loan at 5.2% interest.

22. Using 20th century US census data, the populations of New York state can be modeled by

$$P(t) = \frac{19.71}{1 + 61.22e^{-0.03563t}}$$

where P is the population in millions and t is the number of years since 1800. Based on this model,

(a) What was the population of New York in 1800?

(b) What will be the population of New York in 2020?

23. Given below is the official census population (in millions) of the state of Georgia for the years 1900-1950.

Year	Population
1900	2.2
1910	2.6
1920	2.9
1930	2.9
1940	3.1
1950	3.4

(a) Using your calculator, find an exponential regression model for Georgia's population, and

(b) Use the regression equation (without rounding) to predict when the population will be 5 million.

24. The amount C in grams of carbon-14 present in a certain substance after t years is given by

$$C = 20e^{-0.000121t}$$

(a) What was the initial amount of carbon-14 present?

(b) How much is left after 10,000 years?

(c) What is the half-life of carbon-14? Solve algebraically and graphically.

Expand the expression. Simplify where appropriate.

25. $\log_3\left(\frac{x^3}{81y^2}\right)$

26. $\log\left(10^{-5}z^8 \cdot \sqrt[3]{x^5}\right)$

Use the properties of logarithms to write the expression as a single logarithm.

27. $4\log 2 + \log \frac{1}{2} - 3 \log c$

28. $3\ln a - 2\ln b - \ln a$

29. The relationship between intensity I of light (in lumens) at a depth of x feet in Lake Erie is given by $\log\left(\frac{I}{12}\right) = -0.00235x$. What is the intensity at a depth of 25 feet? Solve algebraically and graphically.

Solve. Show all work!!

30. $\log_3(45) = x$

31. $5e^{3x} - 9 = 28$

32. $3 + 5(0.6)^x = 23$

33. $2\ln\left(\frac{x}{3}\right) - 1 = 5$

34. $\log_3(1 - 3x) + 1 = 5$

35. $\log_3(x + 2) - \log_3(x - 1) = 2$