

Chapter 4 Review

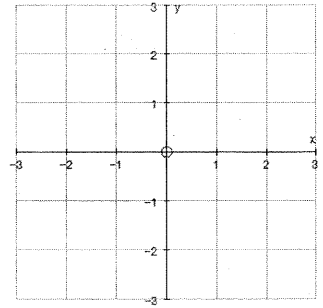
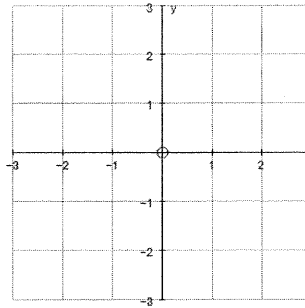
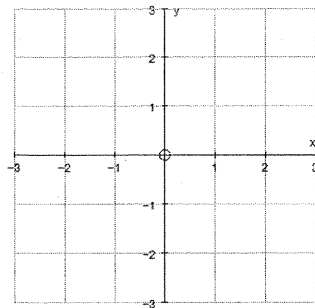
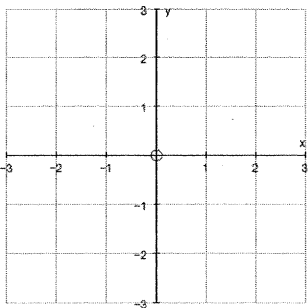
NON-CALCULATOR

On a separate piece of paper, thoroughly explain each of the following terms within the context of this chapter:

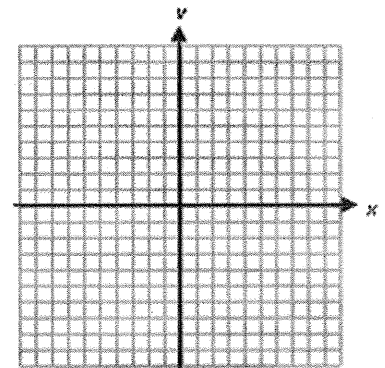
- | | | |
|----------------------|------------------------|------------------------|
| asymptote | exponential growth | logarithmic equation |
| base | exponential regression | logarithmic regression |
| common logarithm | inverse function | natural logarithm |
| exponential decay | inverse relation | |
| exponential equation | logarithm | |

Tell whether the following function shows growth or decay. Then, sketch a graph of the function.

1. $f(x) = 0.5(1.25)^x$ 2. $f(x) = 0.5\left(\frac{3}{2}\right)^x$ 3. $f(x) = 2.5(0.25)^x$ 4. $f(x) = 2(1 + 0.25)^x$

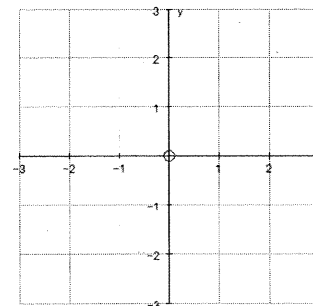


5. Graph $f(x) = \frac{2}{3}x + 2$. Then, find the inverse equation and graph it.



6. Graph the following relation and connect the points. Then graph the inverse in the same plane.

x	-1	0	1	2	3
y	1	0.2	0.04	0.008	0.001



7. The formula $M = \frac{5}{8}K$ gives the approximate distance in miles as a function of kilometers.

- a) Find the inverse of this equation.

- b) Use the inverse equation to express 25 miles in kilometers.

Write each exponential equation in logarithmic form.

8. $3^5 = 243$

9. $1 = 9^0$

10. $\left(\frac{1}{3}\right)^{-3} = 27$

Write each logarithmic equation in exponential form.

11. $\log_2 16 = 4$

12. $\log 10 = 1$

13. $2 = \log_{0.6} 0.36$

Evaluate by using memorized exponents and mental math.

14. $\log_7 49$

15. $\log_{0.5} 0.25$

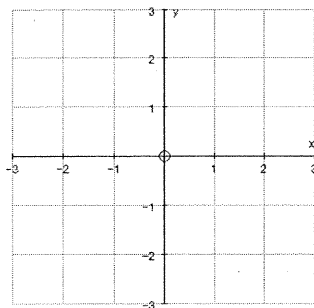
16. $\log_{12} \left(\frac{1}{12}\right)$

17. $\log 0.01$

18. $\log_2 1$

19. Make a table of values for $f(x) = \left(\frac{1}{2}\right)^x$. Then, graph the function and its inverse. Finally, describe the domain and range of the **inverse** function.

x	-1	0	1	2
y				



Domain: _____

Range: _____

Express each as a single logarithm and simplify.

20. $\log_2 8 + \log_2 16$

21. $\log_2 128 + \log_2 2$

22. $\log 100 + \log 10,000$

23. $\log 10 - \log 0.1$

24. $\log_5 25^2$

25. $\log 10^5 + \log 10^4$

26. $\ln e^{x+y}$

27. $e^{\ln 4x}$

Solve and check.

28. $3^{x-1} = \frac{1}{9}$

29. $2^x = 4^{x+1}$

30. $\log_6 (2x+3) = 3$

31. $\log 50 + \log \left(\frac{x}{2}\right) = 2$

32. Write the transformed function: $f(x) = e^x$ is reflected across the x-axis, stretched vertically by a factor of 3 and shifted 2 units down.

Give the intercept and asymptote for each function. Then, describe how the graph is transformed from the graph of the parent function.

33. $k(x) = \frac{3}{5}(2)^{6x}$

y-intercept: _____

asymptote: _____

description: _____

34. $m(x) = 2 \log\left(x + \frac{1}{2}\right)$

x-intercept: _____

asymptote: _____

description: _____

CALCULATOR

35. The student population in a small resort town has increased by 2% per year for the last 5 years. This year's population is 765 students.

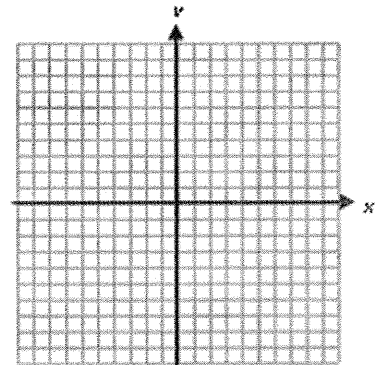
a) Will the function that represents this situation show growth or decay? _____

b) Suppose that the student population continues to follow the same trend. Write a function to show the number of students as a function of the year, starting with the current year.

c) Sketch a graph of the function. Be sure to label your axes!

d) Predict the number of students in 3 years.

e) Now using your calculator, graph and predict when the population will exceed 1000 students.



36. The apparent loudness of music today at Sam's Cafe was 10 decibels louder than it was yesterday.

Apparent loudness L is given by $L = \log \frac{I}{I_0}$, where I is the intensity of the sound in W/m^2 and I_0 is the

lowest intensity that the ear can detect. How many times more intense was the sound today than yesterday?

Evaluate.

37. $\log_3 15$

38. $\log_8 21$

Solve.

39. $\log x^{5/2} > 2.5$

40. $\left(\frac{1}{2}\right)^x \leq 64$

41. $\ln x - 2 = 5$

42. $2 \ln x - \ln x = 3$

43. The population of whooping cranes was about 22 in 1940 and grew at an exponential rate to about 194 in 2003.

- a) Use the exponential growth function $P(t) = P_0 e^{kt}$, where P_0 is the initial population and $P(t)$ is the population at time t , to determine the growth factor, k .
- b) If the flock continues to grow at the same rate, how large will it be in 2020?
- c) When will the population reach 300?

44. Determine whether f is an exponential function of x of the form $f(x) = ab^x$. If so, find the constant ratio.

x	-1	0	1	2	3
f(x)	0.667	1	1.5	2.25	3.375

45. The following table gives the population size of a flock of birds in one habitat over the last 57 years.

Years Since Data was First Collected	5	22	40	57
Population Size	18	22	85	185

- a) Use exponential regression to find an exponential model for the data. Give the equation below:
- b) Use logarithmic regression to find a logarithmic model for the data. Give the equation below:
- c) Using a scatterplot of the graph of the data along with the equations, which do you think is a better fit? EXPLAIN.
- d) Using the equation you chose in part c, predict the population size 65 years after the data was first collected.
- e) How long will it take for the population to reach 240?