

Chapter 10 Review

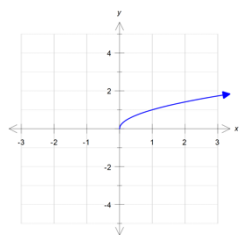
1. For $f(x) = x^2 - 3$ and $g(x) = x - 5$, find:

a. $(f \circ g)(2)$ b. $(g \circ f)(2)$ c. $(f \circ g)(x)$

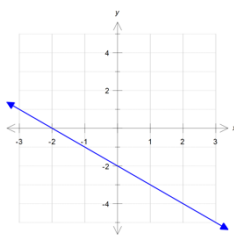
d. $(g \circ f)(x)$

2. Do the following functions have inverses? Explain.

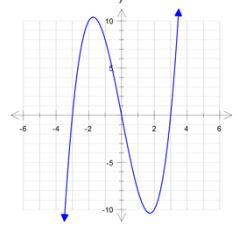
a.



b.



c.



3. Find the inverse of each of the following, if it exists

a. $f(x) = \frac{1}{3}x + 4$

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

c. $f(x) = 2x^3 - 1$

4. Evaluate:

a. $\log_4 16$

b. $\log_b b$

c. $\log_a 1$

d. $\log_8 8^{159}$

5. Rewrite in exponential form:

a. $\log_x 3 = m$

b. $\ln p = q$

6. Rewrite in logarithmic form:

a. $3^4 = 81$

b. $m^n = r$

7. Use a calculator to approximate the following. Round to the nearest thousandth.

a. $\log_2 40$

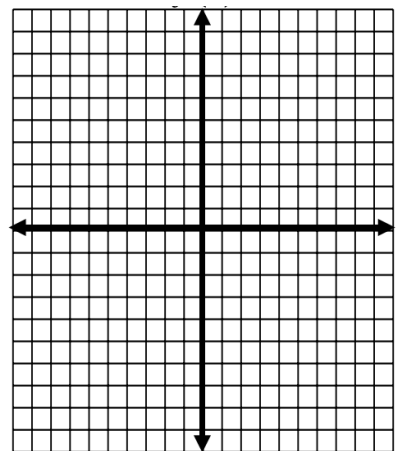
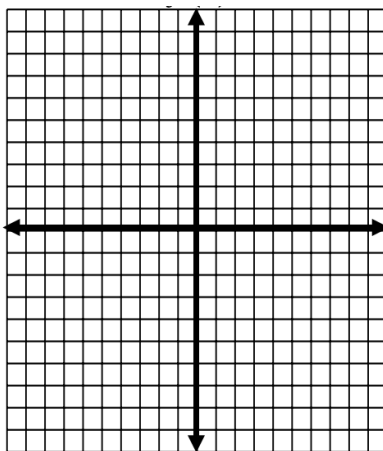
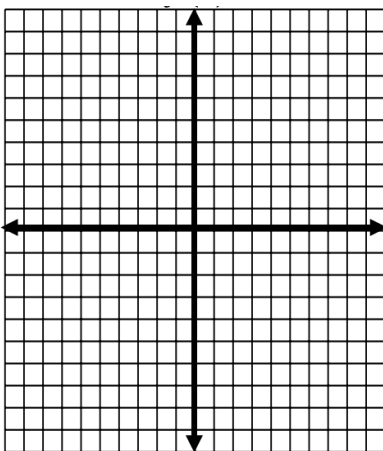
b. $\log_{1/3} 8$

8. Graph each of the following, and give the domain and range.

a. $f(x) = 2^x + 3$

b. $y = \ln x$

c. $y = \log_3(x - 5)$



9. Solve:

a. $2^{3x} = 16$

b. $3^x = 15$

c. $5e^x + 3 = 7$

d. $\log_x 10 = 3$

e. $4 \ln x = 20$

f. $\log(2x - 6) = 2$

10. A laptop computer is purchased for \$1500. Its value each year is about 60% of its value in the preceding year. Its value in dollars after t years is given by the function $V(t) = 1500(0.6)^t$.

a. What is its value after 5 years?

b. After what amount of time will the laptop's value be half the original value?

11. U.S. companies spent \$1.2 billion in e-mail marketing in 2007. This amount was predicted to grow exponentially to \$2.1 billion in 2012.

a. Find the exponential growth rate, k , and write a function of the form $P(t) = P_0 e^{kt}$ that describes the amount (in billions of dollars) , spent on marketing t years after 2007.

- b. Estimate the amount spent on e-mail marketing in 2014.
- c. In what year will U.S. companies spend \$4 billion on e-mail marketing?
- d. Find the doubling time.

12. The number of hepatitis A cases in the U.S. has decreased exponentially since 1995. The number of cases for various years are listed in the table below.

- a. Use regression to find an exponential function of the form $f(x) = ab^x$ that can be used to estimate the number of hepatitis A cases x years after 1995.
- b. Use the function from part (a) to estimate the number of cases of hepatitis A in 2010.

Year	Cases in Hepatitis A (in thousands)
1995	31.6
2000	13.4
2003	7.7
2004	5.7
2005	4.5
2006	3.6
2007	3.0

- c. When will the number of cases decrease to 1 thousand?

Answers

1. a. 6 b. -4 c. $x^2 - 10x + 22$
d. $x^2 - 8$

2. a. yes b. yes c. no

3. a. $f^{-1}(x) = 3x - 12$ b. no inverse c. $f^{-1}(x) = \sqrt[3]{\frac{x+1}{2}}$

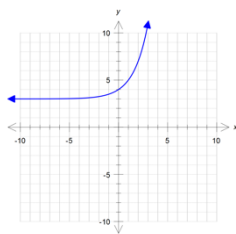
4. a. 2 b. 1 c. 0 d. 159

5. a. $x^m = 3$ b. $e^q = p$

6. a. $\log_3 81 = 4$ b. $\log_m r = n$

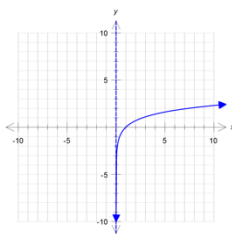
7. a. 5.322 b. -1.893

8. a.  b.  c.



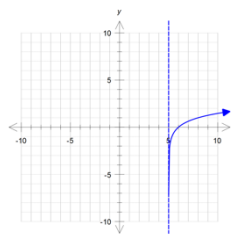
domain: $(-\infty, \infty)$

range: $(3, \infty)$



domain: $(0, \infty)$

range: $(-\infty, \infty)$



domain: $(5, \infty)$

range: $(-\infty, \infty)$

9. a. $x = \frac{4}{3}$ b. $x = \frac{\ln 15}{\ln 3}$ c. $x = \ln(4/5)$

- d. $x = \sqrt[3]{10}$ e. $x = e^5$ f. $x = 53$

10. a. \$116.64 b. 1.36 years

11. a. $P(t) = 1.2e^{0.112t}$ b. \$2.6 billion c. 2018 d. 6.2 years

12. a. $f(x) = 33.8684(0.8196)^x$

- b. 1700 cases c. 17.7 years