

Chapter 1 Review

1. Solve.

a. $x - \frac{1}{12}x - \frac{1}{2}x - \frac{5}{6} = 0$

b. $\frac{1}{x} = \frac{16}{9x} + 7$

c. $(t-7)^2 = (t+7)^2 + 168$

d. $\frac{6}{x+3} - \frac{3}{x} = \frac{9}{2x+6}$

e. $(2x+1)^4 - 10 = 20$

f. $(x-4)^5 = 32$

g. $\sqrt{4x+28} - 3\sqrt{2x} = 0$

h. $x+2 = \sqrt{2x+28}$

i. $4-x = \sqrt{10-3x}$

2. Factor. (Note...these do NOT say solve...but you should be able to solve any that have 1 variable if they were set equal to zero...and you may want to practice this)

a. $12x^2y^4 - 3xy^5 + 9x^3y^2$

b. $x^5 - 9x^{5/2} + 18$

c. $8x^3 + 27y^9$

d. $3x^3 - 2x^2 + 18x - 12$

e. $4(2a + b)^2 - 13(2a + b) - 12$

f. $(4a + b)^2 - (a + 7b)^2$

g. $3x^{3/2} + 20x^{1/2} - 7x^{-1/2}$

h. $x^2(x^2 - 16) - 9(x^2 - 16)$

i. $25 - 16t^4$

4. Use the relationship between Celsius and Fahrenheit (from the book) to find the interval on the Fahrenheit scale corresponding to the temperature range $20 \leq C \leq 30$

5. A phone company offers two monthly plans.

Plan A: \$40 per month for all calls and \$0.10 for each text message.

Plan B: \$70 unlimited talk and text.

For how many texts, would Plan B be financially advantageous?

b Solve the inequality, include a number line and to put answers in set or interval notation.

a. $2|x+7|+12 > 17$

b. $4-x \geq 4x+9$

c. $|2x-5|+7 \leq 17$

d. $x^2+x > 6$

e. $49x \leq x^3$

f. $\frac{x}{x+1} > 6x$

g. $x^4 > x^2$

h. $\frac{5}{6} \geq \frac{2x-5}{24} > \frac{1}{12}$

i. $x(x-3)(x+4) < 0$

j. $2x^2+9x > 7$

k. $\frac{1}{x-3} \leq 3$

l. $\frac{1}{x-2} \geq \frac{2}{x+3}$

Chapter 2 Review

1. Evaluate:

a. $f(x) = x^2 + 9x$ at $f(4)$

b. $f(x) = \frac{19-x}{7+x}$ at $f(3)$

c. $f(x) = \begin{cases} x^2 + 2x & \text{if } x \leq 4 \\ 3x & \text{if } x > 4 \end{cases}$ for $f(1), f(5), f(4)$

2. Find the Average Rate of Change for $f(x) = 3x^2 + 3$ between the following values:

a. $[2, 5]$

b. $[2, a]$

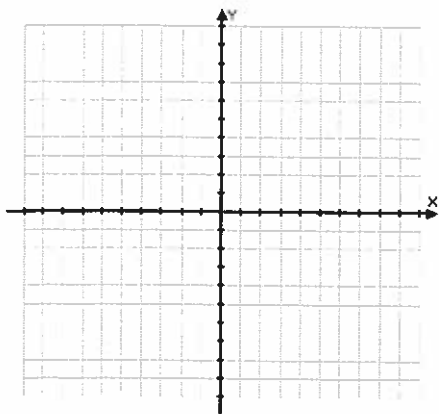
c. $[a, a+h]$

3. Sketch a graph and find the Domain for the following:

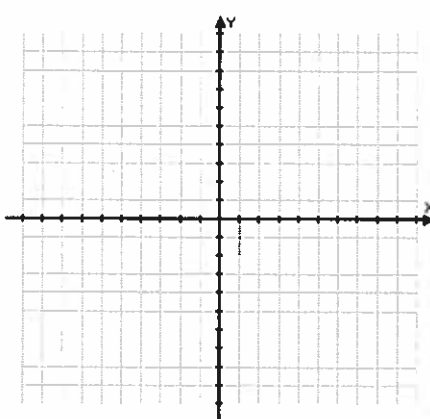
a. $f(x) = -\sqrt{1-x^2}$

b. $f(x) = 3x^2 - 6x + 1$

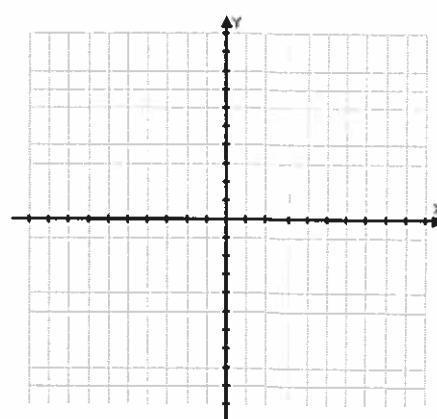
c. $f(x) = \frac{x-1}{2x+5}$



D:

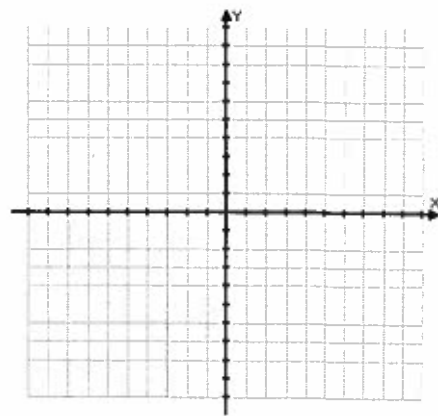


D:



D:

$$4. \text{ Graph: } f(x) = \begin{cases} \frac{3}{x+2} & \text{if } x < -1 \\ -x^2 + 5 & \text{if } -1 \leq x \leq 3 \\ -x + 5 & \text{if } x > 3 \end{cases}$$



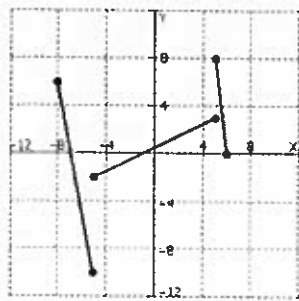
5. If $f(x) = 2x + 9$ and $g(x) = -x^2 + 2x$, the following:

- a. $f(x^2)$ b. $(f(x))^2$ c. $f \circ g(2)$ d. $(g \circ f)(x)$ e. $\frac{f}{g}(1)$

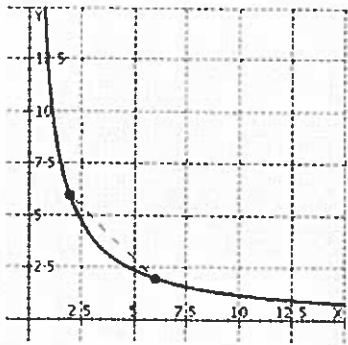
6. Determine when $f(x)$ and $g(x)$ are increasing and decreasing:

a.

b. $g(x) = x^4 - 4x^3 - 3x^2$



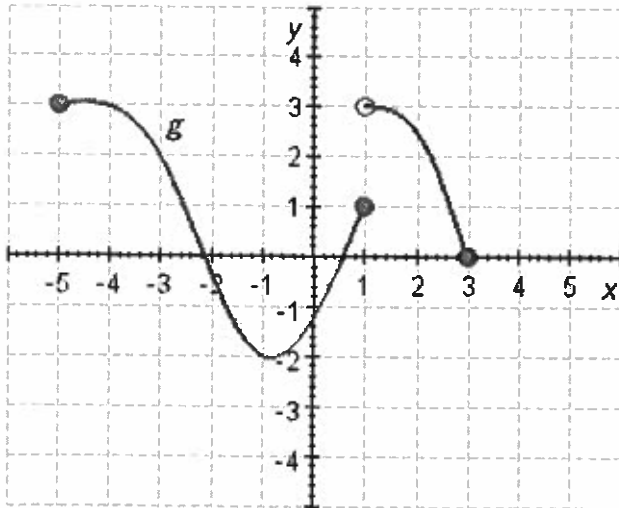
7. Find the average rate of change between the given values:



8. A man is running around a circular track 200 m in circumference. An observer uses a stopwatch to time each lap, obtaining the data in the table as follows:

Time (s)	Distance (m)
38	200
84	400
138	600
200	800
270	1,000
348	1,200
434	1,400

9. The graph of a function g is given.



(a) Find $g(-5)$.

(b) Find $g(-3)$.

(c) Find $g(-1)$.

(d) Find $g(1)$.

(e) Find $g(3)$.

(f) Find the domain of g .

10. Suppose the graph of f is given. Describe how the graph of the function can be obtained from the graph of f .

a. $y = 7f(x) - 3$

b. $y = -f(-3x) + 1$

c. $y = f(x - 2) + 1$

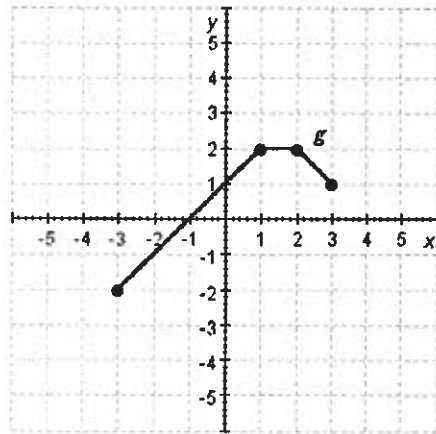
11. The follow graphs can be obtained by shifting the graph of $g(x) = \sqrt{x}$

a. $g(x) = -4\sqrt{x+3} - 4$

b. $g(x) = -2\sqrt{-\frac{1}{2}x + 6}$

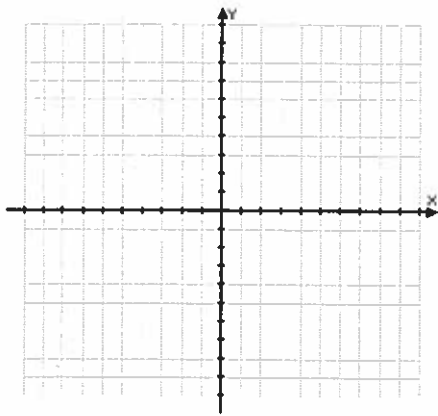
c. $g(x) = \sqrt{x-5} - 1$

12. Graph the following translations for the function $g(x)$ given below

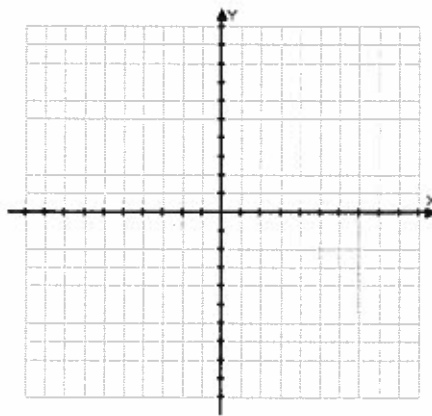


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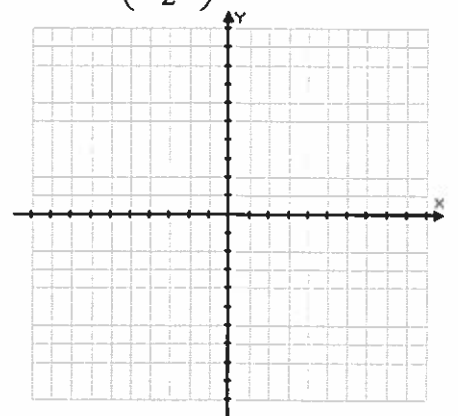
a. $3g(x)$



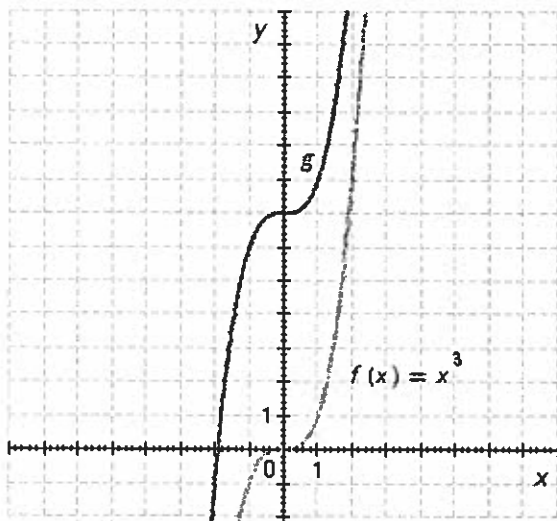
b. $g(x-3)$



c. $g\left(-\frac{1}{2}x\right)$

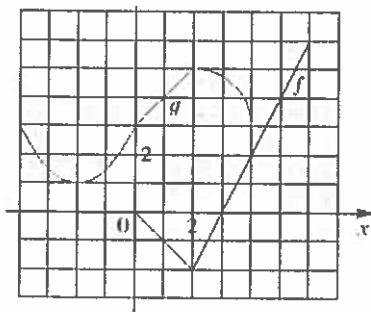


13. The graphs of f and g are given. Find a formula for the function g .



14. Determine if $f(x) = \frac{9-x}{7}$ and $g(x) = 9-7x$ are inverses.

15. Given the two functions, evaluate the following:



- a. $f(g(2))$ b. $2f(0) - 3g(-1)$ c. $g(f(2))$ d. $\frac{f}{g}(1)$

16. For $f(x) = x^5 + 5$, $g(x) = x - 8$, and $h(x) = \sqrt{x}$ find the following:

- a. $f \circ g \circ h$ b. $(f \circ g)(9)$ c. $h(g(x))$ d. $f(h(2))$ e. $2f(x) - g(x)$

17. Express $G(x)$ in the form $f \circ g$ when $G(x) = \frac{x^3}{x^3 + 2}$

18. Assume f is one-to-one. If $f(x) = 3 - 6x$, find $f^{-1}(9)$

19. Find the inverse of the following:

- a. $f(x) = \frac{x-7}{x-8}$ b. $g(x) = \frac{1}{x+2}$ c. $h(x) = 2 \log_3(x-5)$ d. $i(x) = 2 + \sqrt[3]{x-4}$

20. A woman 5.2 ft tall is standing near a street lamp that is 14 ft tall. Find a function that models the length L of her shadow in terms of her distance d from the base of the lamp.
21. Two ships leave port at the same time. One sails north 20 mph, and the other sails east at 20 mph.
- Find a function that models the distance D between the two ships in terms of the time elapsed since their departure.
 - How far are the ships from each other after 45 minutes.
22. A poster is 10 inches longer than it is wide. Find a function that models its area A in terms of width w .
23. A rancher with 750 ft. of fencing wants to enclose a rectangular area and then divide it into four pens with fencing parallel to one side of the rectangle.
- Find a function that models the total area of the four pens.
 - Find the largest possible total area of the four pens.

Chapter 3 Review

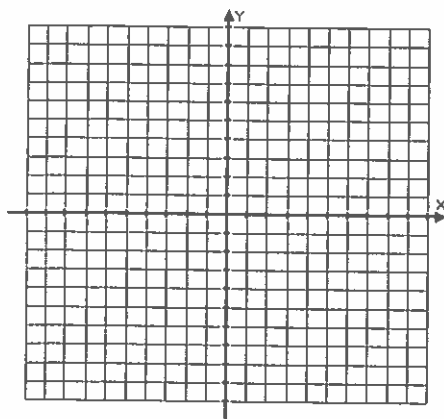
1. Use limit notation to describe the end behavior of the graph of the function:

a. $y = 3x^3 - 7x^2 + 4x + 5$

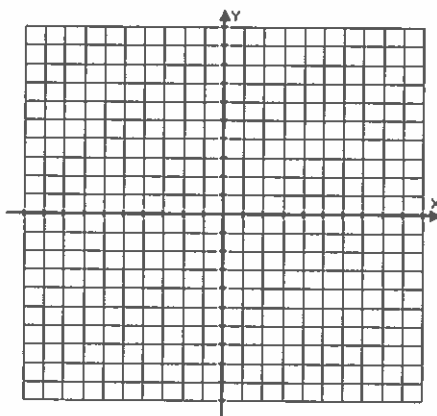
b. $y = -(x-3)^3(x+1)^2(x+1)$

2. Sketch the graph of each function.

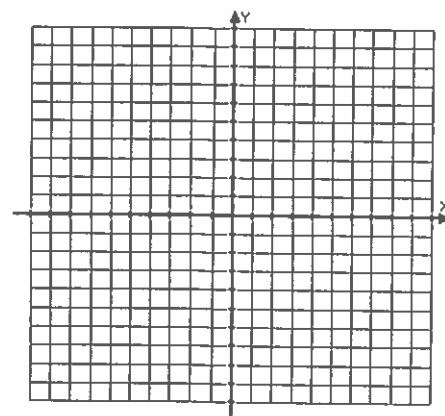
a. $P(x) = (x-2)^2(x-3)$



b. $P(x) = -x^3 - 3x^2 + 4x$



c. $P(x) = -x^4 + 10x^2 + 8x + 8$



3. Find the quotient using synthetic division:

a. $(x^4 - 2x + 1) \div (x + 1)$

b. $(x^3 + 10x^2 + 26x + 14) \div (x + 6)$

4. Using synthetic substitution, evaluate $f(3)$ for $f(x) = 3x^3 + 2x - 5$

5. Find a specific polynomial in standard form with:

a. Degree 3 with zeros of -1, 1, and 4,
passing through the point (2, -3).

b. Degree 3 with zeros of 3 and $5i$
passing through the point (0, 4)

6. Factor. Then find all real zeros of the polynomial:

a. $P(x) = x^3 + 5x^2 + 7x + 3$

b. $P(x) = x^4 - x^2 - 2$

c. $P(x) = 5x^4 - 40x$

d. $P(x) = x^3 + 6x^2 - 32$

e. $P(x) = x^3 + 6x^2 + 7x - 4$

f. $P(x) = 8x^3 - 12x^2 + 2$

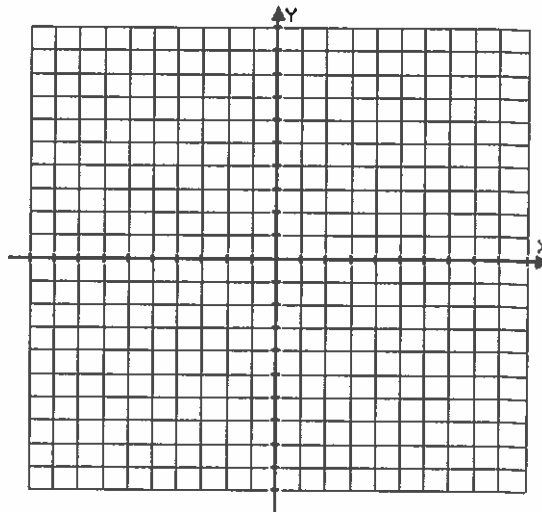
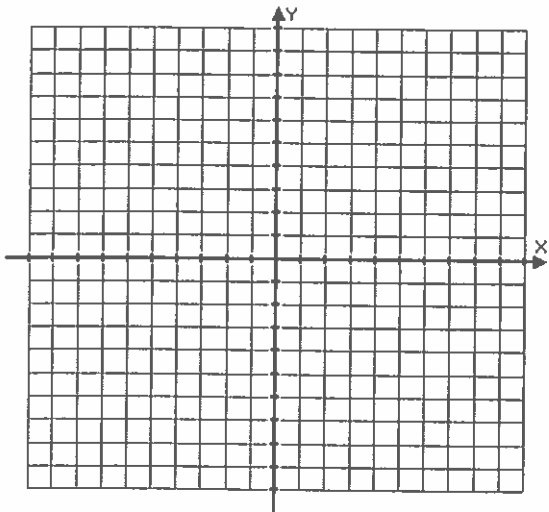
7. Factor into linear factors. Then find all (real and imaginary) the zeros of:

$$P(x) = x^3 + x^2 + 36x + 36$$

8. Graph the rational function: Find the Vertical Asymptote (and the limits associated with it), Horizontal Asymptote (and the limits associated with it), any removable discontinuities, x-intercept(s), and y-intercept.

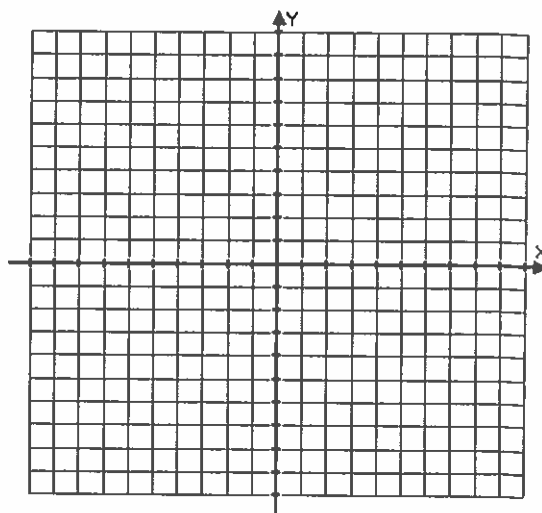
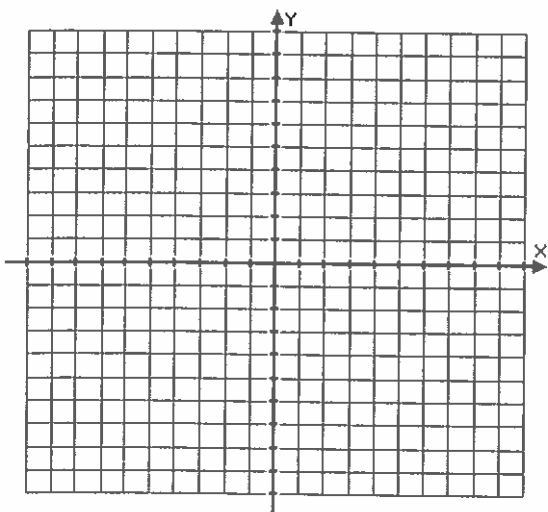
a. $f(x) = \frac{x-3}{x^3-9x}$

b. $f(x) = \frac{3x+6}{x^2+6x+8}$



c. $f(x) = \frac{x^2}{x-5}$

d. $f(x) = \frac{x^2-7x+12}{x^2-x-6}$



9. An open box is to be constructed from a piece of cardboard 24 cm by 35 cm by cutting squares of side length x from each corner and folding up the sides.

a. Express the volume V of the box as a function of x .

b. Determine the domain of V .

c. Determine the maximum volume of the box.

10. A rectangular parcel of land has an area of $5,000 \text{ ft}^2$. A diagonal between opposite corners is measured to be 20 ft longer than one side of the parcel. What are the dimensions of the land to the nearest foot?

11. When two resistors with resistance R_1 and R_2 are connected in parallel, their combined resistance R is given by the formula: $R = \frac{R_1 R_2}{R_1 + R_2}$. Suppose that a fixed 10-ohm resistor is connected in parallel with a variable resistor. Given R as a function of the resistance of the variable resistor x .

Will the combined resistance with one fixed resistor of 10-ohm ever reach 20 ohm?