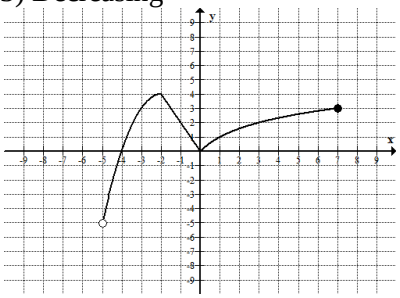
Review - Chapter 2

1) Find $f(x + 1)$ when $f(x) = 4x^2 - 2x + 5$.

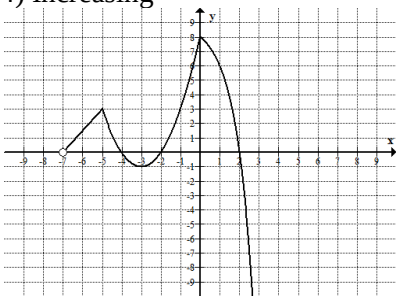
2) Find $f(2x)$ when $f(x) = 2x^2 - 3x + 2$.

Identify the intervals where the function is changing as requested.

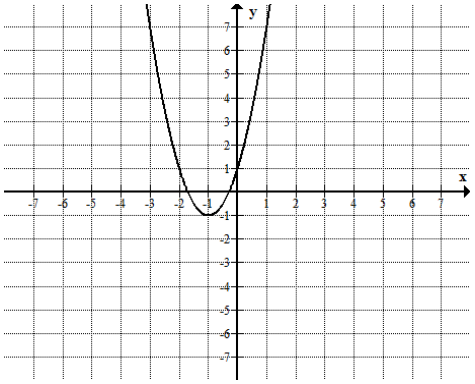
3) Decreasing



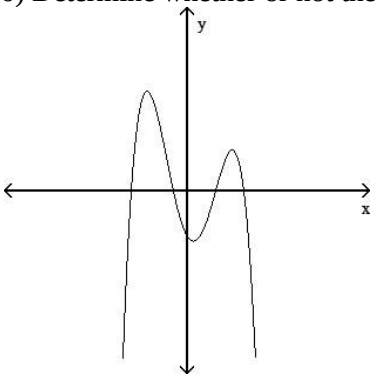
4) Increasing



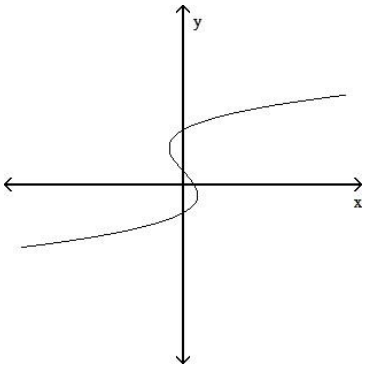
5) Use the graph of the function f, given below, to sketch the graph of the given function $g(x) = -f(x + 2) + 2$. Use the transformations. Do one transformation at a time.



6) Determine whether or not the graph below is the graph of a function of x. Explain.

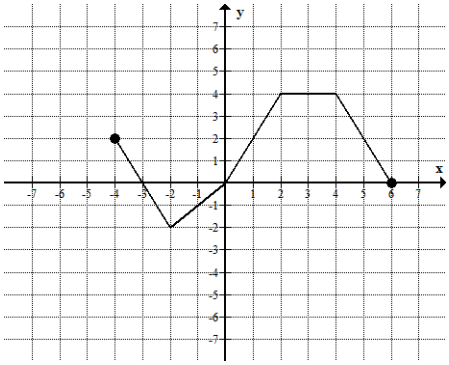


7) Determine whether or not the graph below is the graph of a function of x. Explain.

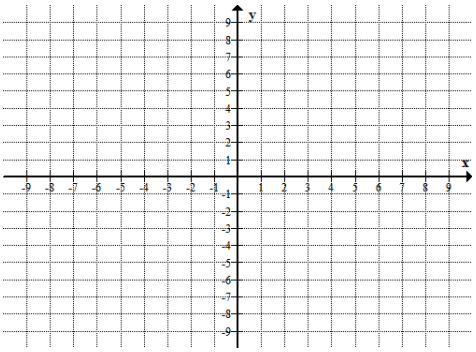


A graph of y = f(x) is given . No formula for f is given. Graph the given equation.

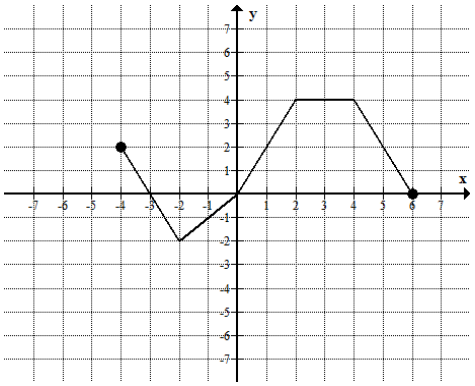
8) y = f(x)



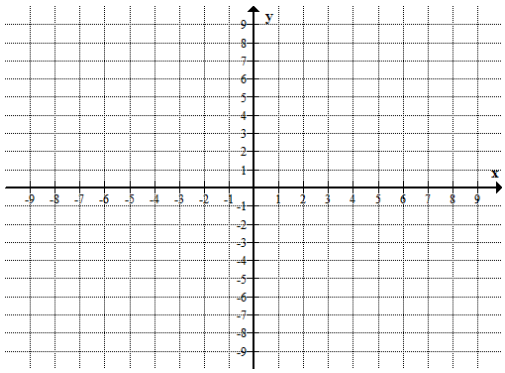
y = f(2x)



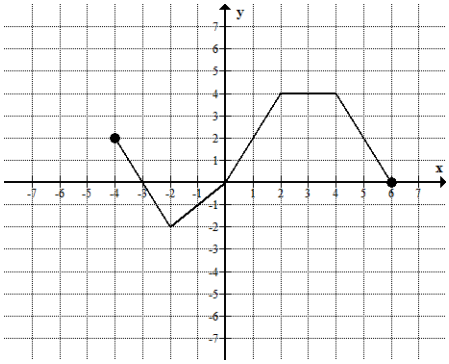
9) y = f(x)



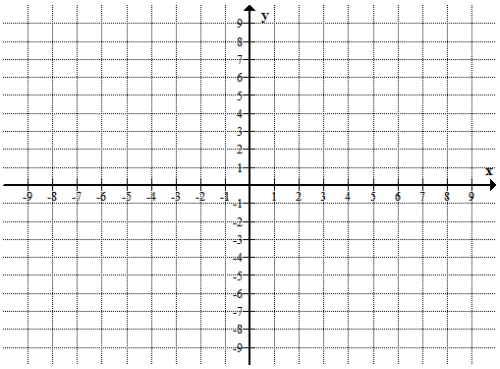
y = -2f(x + 1) - 3



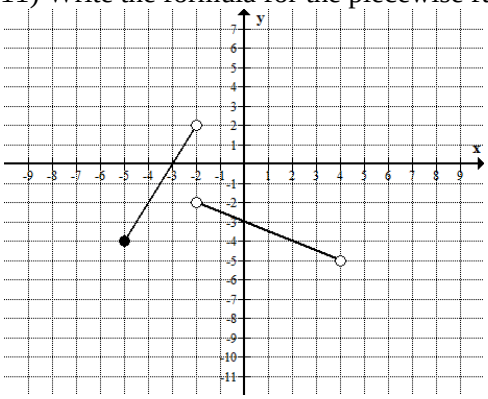
10) y = f(x)



y = 2f(x)



11) Write the formula for the piecewise function whose graph is given below.



12) Function f is given below. Find f(-4), f(-2) , f(0), f(1), f(3), f(100) .

$$f(x)=\begin{cases}3x+2 & for \quad x<-2\\ x & for \quad -2\le x\le 3\\ 2x-1 & for \quad x>3\end{cases}$$

13) Determine whether the function $f(x) = x^3 + 3x^2$ is even, odd, or neither.

14) Let $f(x) = \frac{7}{x+8}$, and $g(x) = \frac{4}{5x}$. Find $(f \circ g)(x)$

15) Find the x- and y-intercepts of $f(x) = -x^2(x+5)(x^2+3)$

16) Graph $f(x) = (x+3)^3 - 4$ to determine whether f is a one-to-one function. If it is, find its inverse.

17) How can the graph of $f(x) = -(x-2)^2 + 3$ be obtained from the graph of $y = x^2$? List the transformations in the correct order.

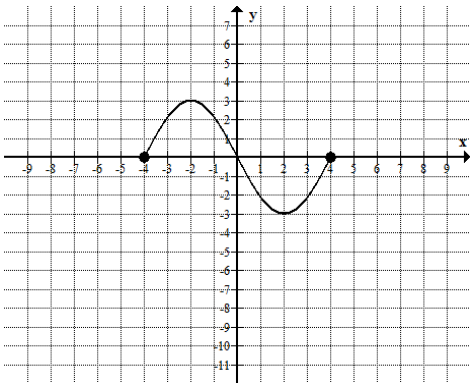
18) Find the inverse of the given function. Justify why the inverse exists.

a) $f(x) = 3x^2 - 6, x \ge 0$

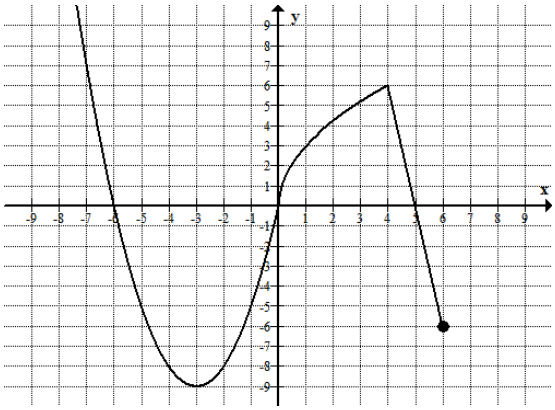
b) $f(x)=\frac{2x-1}{3-5x}$

19) Find functions f and g so that $h(x) = (f \circ g)(x)$ where $h(x) = \frac{1}{\sqrt{2x-1}}$

20) The graph of the function f is shown below. Graph, using transformations, $g(x) = f(-x) + 3$



21) Determine the domain and range of the function.

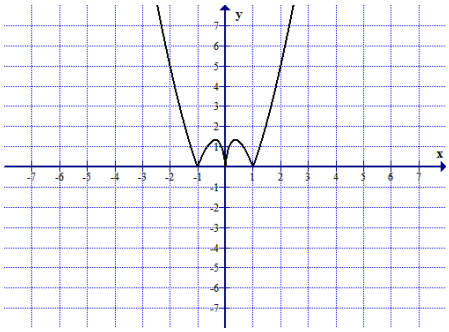


22) For the function $f(x) = \frac{3}{x-5}$, construct and simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$.

23) Given $f(x) = \frac{2}{x}$ and $g(x) = \frac{2}{3x-1}$ Find the domain of the composite function fog.

24) Let $f(x) = \sqrt{1-4x}$. Determine i) the domain of the function, ii) the range of the function, iii) the domain of the inverse and iv) the range of the inverse.

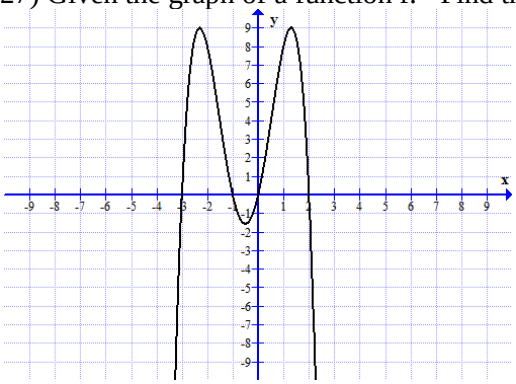
25) Determine whether the graph is the graph of an even function, an odd function, or a function that is neither even nor odd. Justify your answer.



26) Graph the function.

$$f(x) = \begin{cases} 3x+2 & for \quad x < -2 \\ x & for \quad -2 \le x \le 3 \\ 2x-1 & for \quad x > 3 \end{cases}$$

27) Given the graph of a function f. Find the intervals of x on which f(x) < 0



In problems 28-29, find the domain of the function.

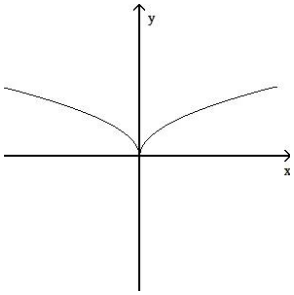
28) f(x) = $\sqrt{16-x}$

29) f(x) = $\dfrac{1}{x^2+3x-18}$

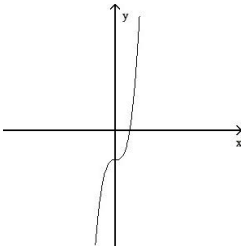
30) Given functions f(x) = $\dfrac{2x}{x-1}$ and g(x) = $\dfrac{4}{x+2}$, find (and simplify) formula for f+ g and f/g and determine their domains.

31) Determine whether the function ,whose graph is given below, is one-to one. Explain

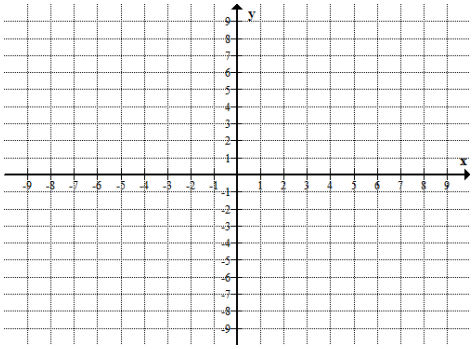
a)



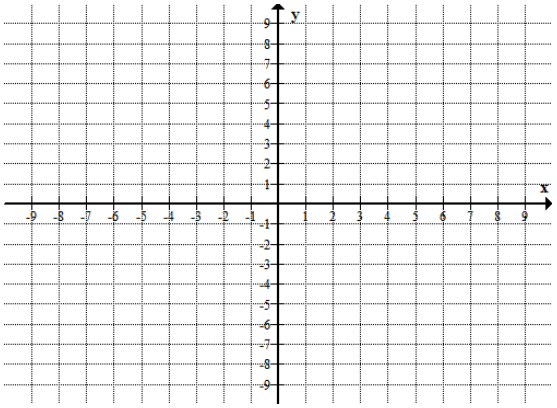
b)



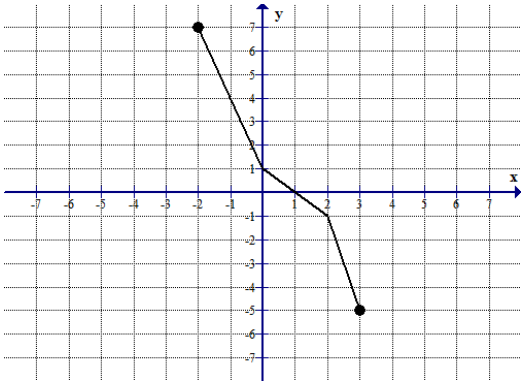
32) Begin by graphing the basic function f(x) =|x|. Then use transformations to graph h(x) = - |x+5|



33) Begin by graphing the basic function f(x) = $\sqrt{x}$. Then use transformations to graph g(x) = $\sqrt{-x+5}$



34) The graph of a function f is given below. Determine whether this function has the inverse. If yes, draw the graph of f^{-1}.

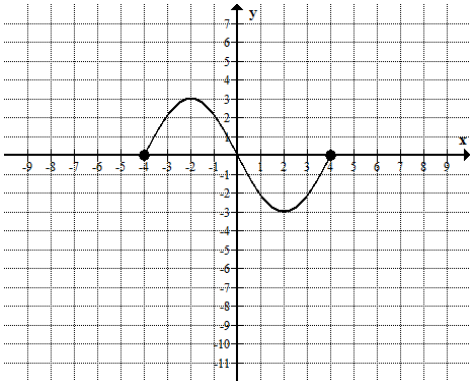


35) Find two functions f and g (none identity function) so that $(f \circ g)(x) = h(x)$ if

a) $h(x) = \sqrt[5]{3x-8}$

b) $h(x) = |x^2 - 3|$

36) The graph of the function f is shown below. Graph, using transformations, $g(x) = f(2x+4)$

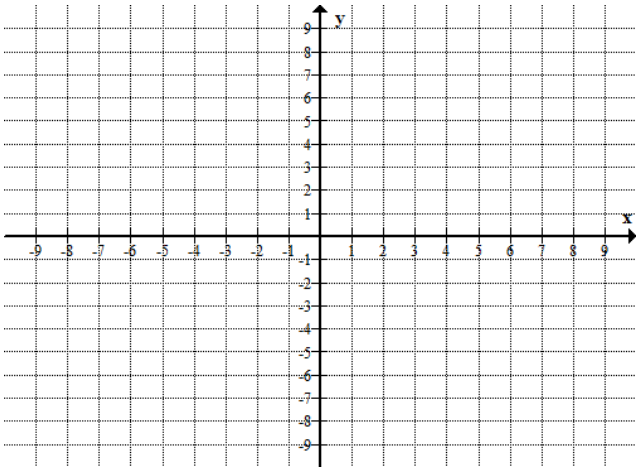


37) For the function f(x) = $\sqrt{x+1}$, construct and simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$

38) The graph of f(x) = $\sqrt{x}$ was transformed in the following order: 1) horizontally stretched by a factor of 3; 2) reflected about the y-axis ;3) shifted left by 6; 4) vertically compressed by a factor of 2; 5) shifted down 4 units. What's the equation of the resulting function?

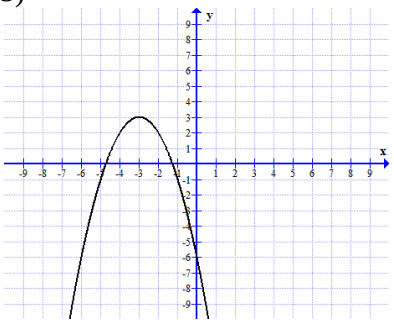
39) Graph the function

$$f(x)=\begin{cases}(x+3)^2 & for \quad x\le -1\\ 2x-4 & for \quad -1<x<4\\ 2\sqrt{x-4} & for \quad x\ge 4\end{cases}$$

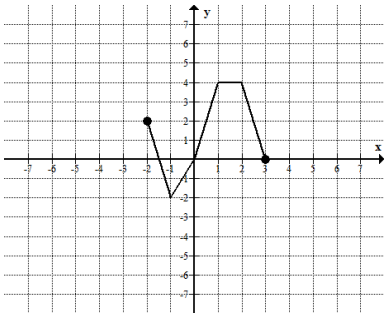


Answers

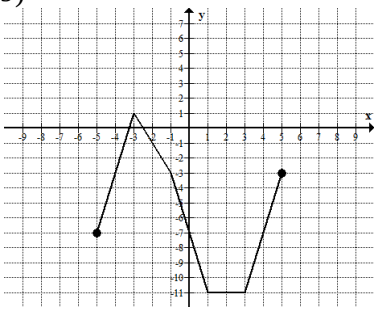
1) $4x^2 + 6x + 7$
2) $8x^2 - 6x + 2$
3) (-2, 0)
4) (-7, -5) ∪(-3, 0)
5)



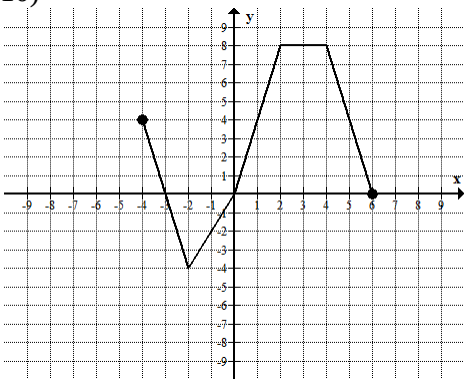
6) function
7) not a function
8)



9)



10)



11)

$$f(x)=\begin{cases}2x+6, & -5\le x<-2\\ -\frac{1}{2}x-3, & -2<x<4\end{cases}$$

12) -10,-2, 0, 1, 3, 199

13) Neither

14) $\frac{35x}{4+40x}$

15) x-intercepts: - 5, 0; y-intercept: 0

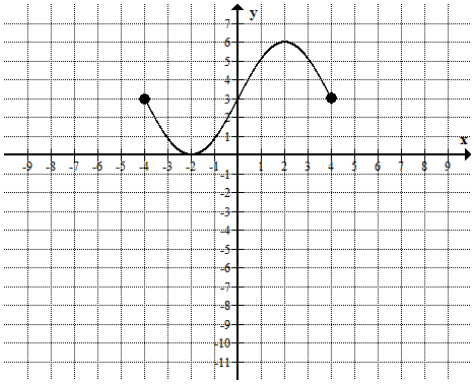
16) Yes, $f^{-1}(x)=\sqrt[3]{x+4}-3$

17) Shift it horizontally 2 units to the right. Reflect it across the x-axis. Shift it 3 units up.

18) a) $f^{-1}(x)=\sqrt{\frac{x+6}{3}}$; b) $f(x)=\frac{3x+1}{2+5x}$

19) f(x) = $\frac{1}{\sqrt{x}}$, g(x) = 2x -1

20)



21) domain: $(-\infty, 6]$; range: $[-9, +\infty)$

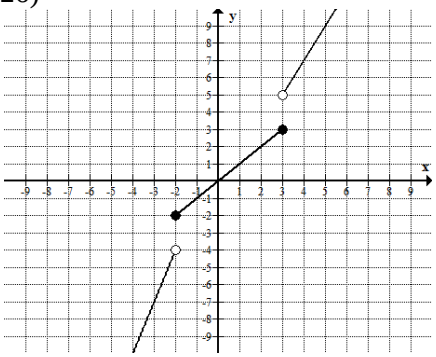
22) $\dfrac{-3}{(x+h-5)(x-5)}$

23) $\{x \mid x \neq 1/3\}$

24) domain of f = $(-\infty, ¼]$= range of f^{-1} ; range of f = $[0,+\infty)$ = domain of f^{-1}

25) Even

26)



27) $(-\infty,-3) \cup (-1,0) \cup (2, +\infty)$

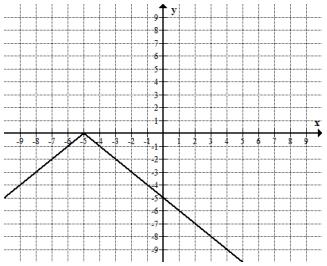
28) $\{x|x \leq 16\} = (-\infty, 16]$

29) $\{x|x \neq -6 \text{ and } x \neq 3\} = (-\infty, -6) \cup (-6, 3) \cup (3, \infty)$

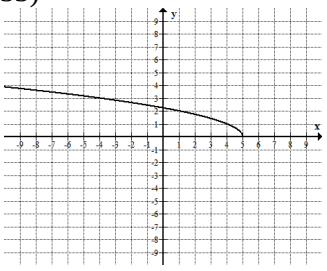
30) $(f+g)(x) = \dfrac{2x^2+8x-4}{(x-1)(x+2)}$, D(f+g) = $(-\infty, -2) \cup (-2, 1) \cup (1, \infty)$; $(f/g)(x) = \dfrac{x^2+2x}{2(x-1)}$, D(f/g) = $(-\infty, -2) \cup (-2, 1) \cup (1, \infty)$;

31) a) no; b) yes

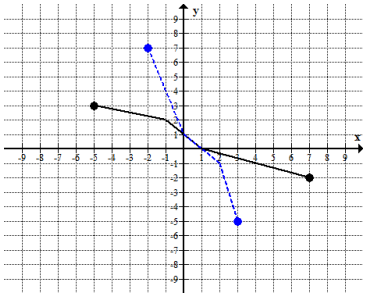
32)



33)

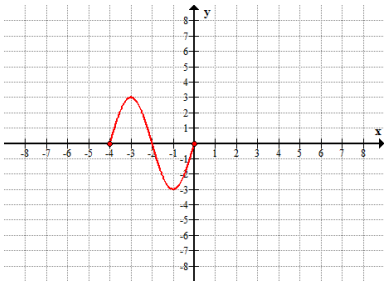


34) yes,



35 a) $f(x)=\sqrt[5]{x}; g(x)=3x-8$; b) $f(x)=|x|;\ \ g(x)=x^2-3$

36)



37) $\dfrac{1}{\sqrt{x+h+1}+\sqrt{x+1}}$

38) $y=\dfrac{1}{2}\sqrt{-\dfrac{1}{3}x-2}-4$

39)