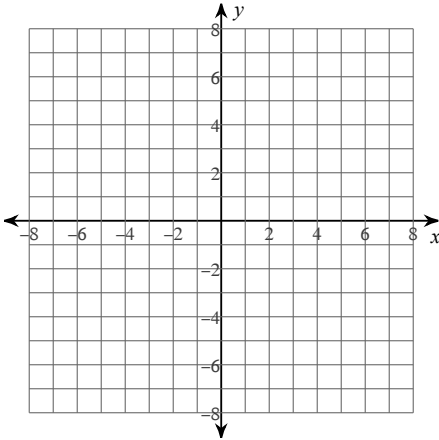


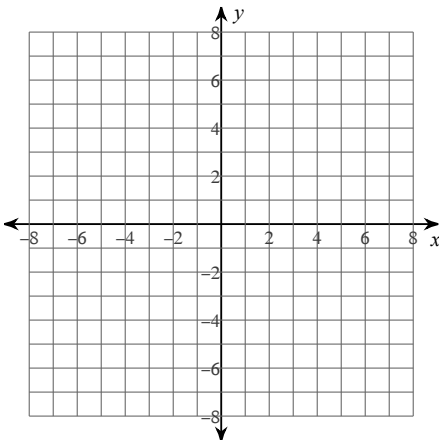
Classwork/Homework

For each function, identify the points of discontinuity, holes, intercepts, horizontal asymptote, domain, and limit behavior at all vertical asymptotes. Then sketch the graph.

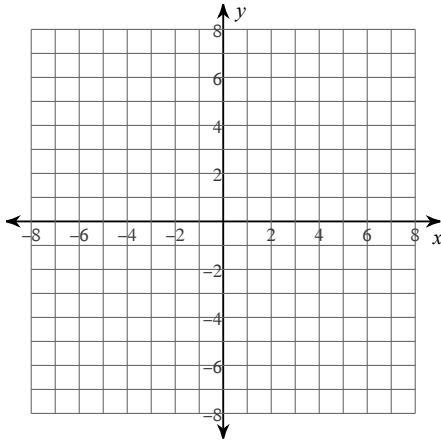
$$1) f(x) = \frac{x^3 - 5x^2 + 4x}{4x^2 - 8x - 12}$$



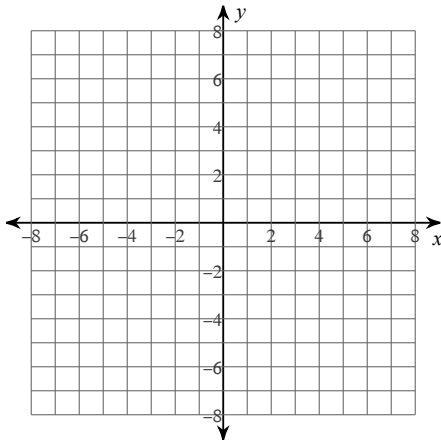
$$2) f(x) = \frac{x^2 - x}{-2x^2 + 2x + 12}$$



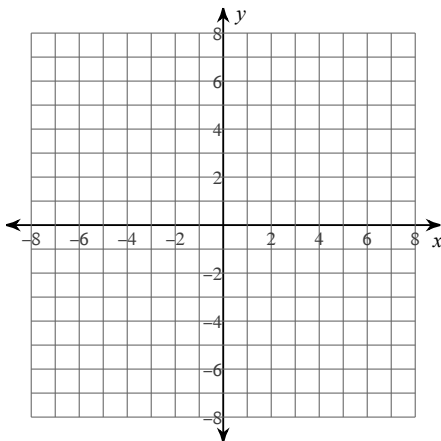
$$3) f(x) = \frac{x^3 + 7x^2 + 12x}{-4x^2 - 8x + 12}$$



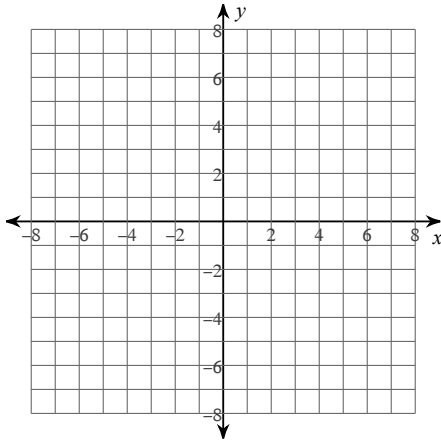
$$4) f(x) = \frac{x^2 - 2x - 3}{-3x + 6}$$



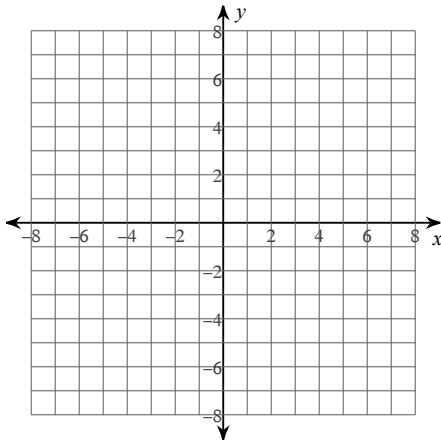
$$5) f(x) = \frac{x^3 - 16x}{-4x^2 - 16x}$$



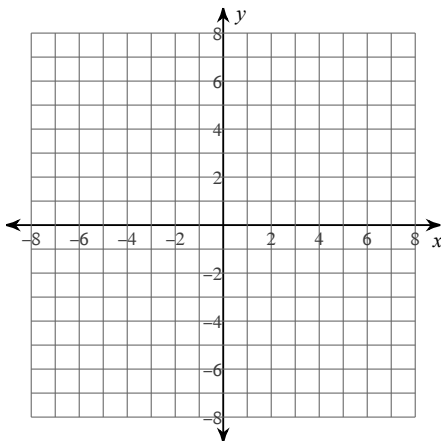
$$6) f(x) = \frac{x^2 + 5x + 4}{-4x - 12}$$



$$7) f(x) = \frac{x^3 + 3x^2 - 4x}{4x^2 - 36}$$



$$8) f(x) = -\frac{4}{x^2 + x - 6}$$



Solve each inequality.

$$9) \frac{x-6}{x-2} \geq 0$$

$$10) \frac{x-7}{x+8} \geq 0$$

$$11) \frac{-x+5}{2x+12} \geq 5$$

$$12) \frac{4x-75}{x+6} < -5$$

$$13) \frac{x-8}{(x+3)(x+7)} > 0$$

$$14) \frac{x-6}{(x+3)(x+7)} < 0$$

$$15) \frac{x-4}{x^2-4x-32} < 0$$

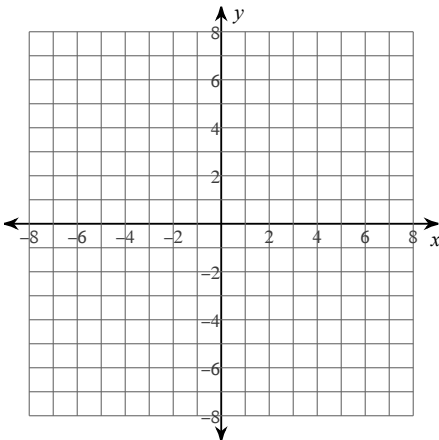
$$16) \frac{x^2-6x+5}{x+3} < 0$$

$$17) \frac{12}{x-7} \leq \frac{11}{x-6}$$

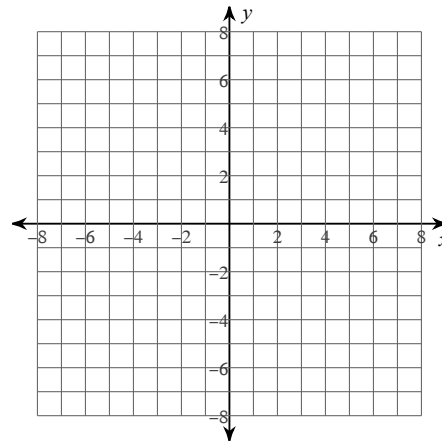
$$18) \frac{3}{x-7} \geq \frac{2}{x-6}$$

Sketch the graph of each function.

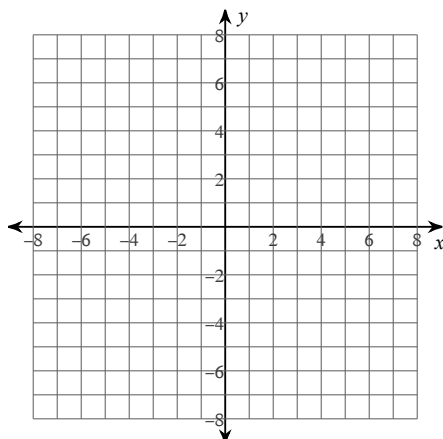
$$19) g(x) = \begin{cases} x+2, & x < -1 \\ \frac{1}{x+1}, & x > -1 \end{cases}$$



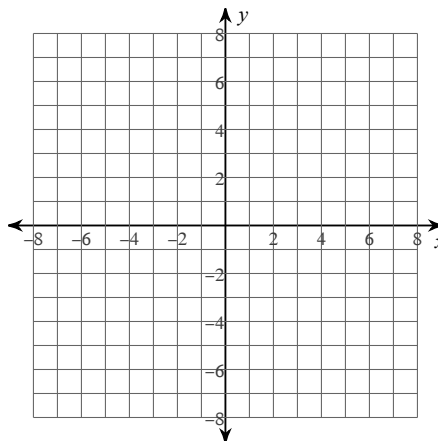
$$20) f(x) = \begin{cases} \sqrt{-3x}, & x < -3 \\ \frac{1}{x} - 4, & x = -3 \\ 3 + \sqrt{x}, & x > -2 \end{cases}$$



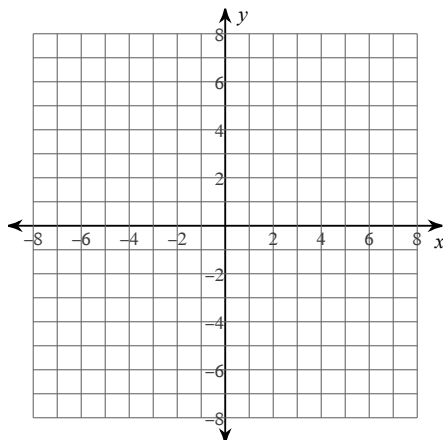
$$21) w(x) = \begin{cases} \frac{|x|}{2}, & x \leq -2 \\ (x+1)^2, & x > -2 \end{cases}$$



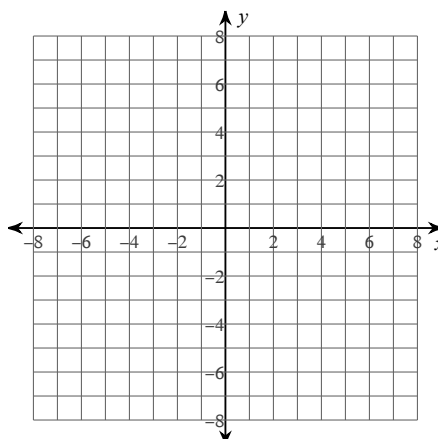
$$22) f(x) = \begin{cases} \frac{1}{x+3}, & x < -4 \\ 0, & -4 < x < 1 \\ (x-2)^2, & x > 1 \end{cases}$$



$$23) f(x) = \begin{cases} (x-2)^3, & x < 3 \\ -|x|, & x = 3 \\ (x-3)^2, & x > 3 \end{cases}$$

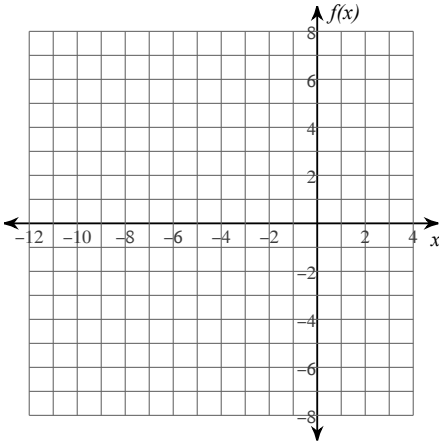


$$24) f(x) = \begin{cases} \frac{|x|}{2}, & x \leq -4 \\ \frac{1}{x} - 3, & x > -4 \end{cases}$$

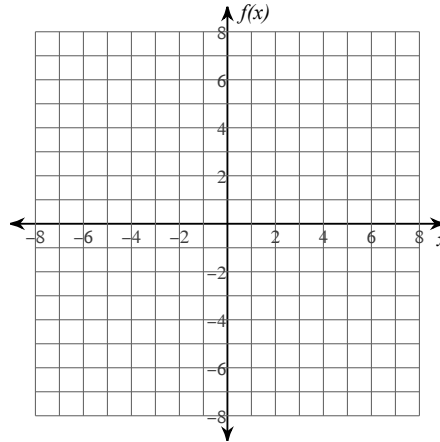


Determine if each function is continuous at the given x -values. If not continuous, classify each discontinuity. You may use the provided graph to sketch the function.

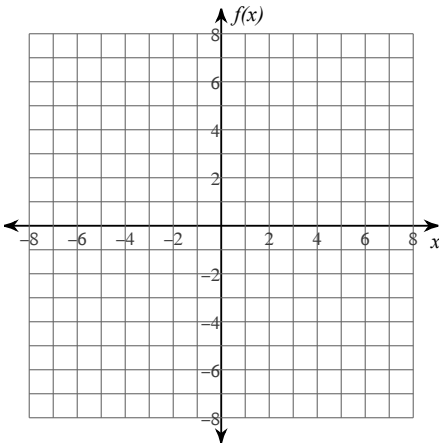
25) $f(x) = -\frac{x^2}{4x + 16}$; at $x = -4$



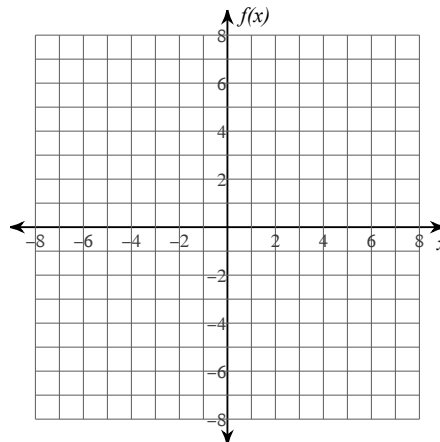
26) $f(x) = 2x^2 - 4x + 1$; at $x = -1$



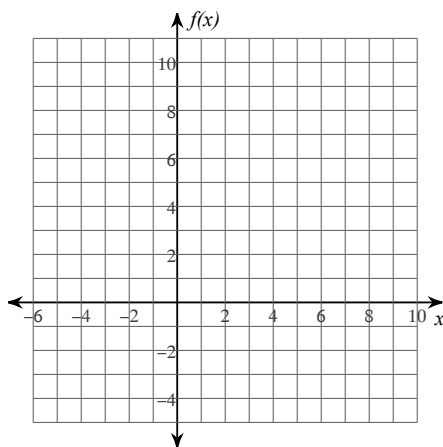
27) $f(x) = -\frac{4x}{x^2 + 4}$; at $x = 4$



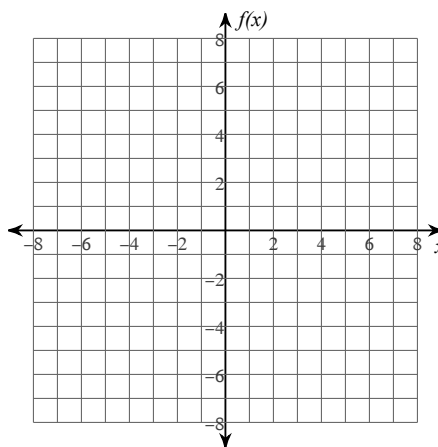
28) $f(x) = -2x^2 + 8x - 3$; at $x = 3$



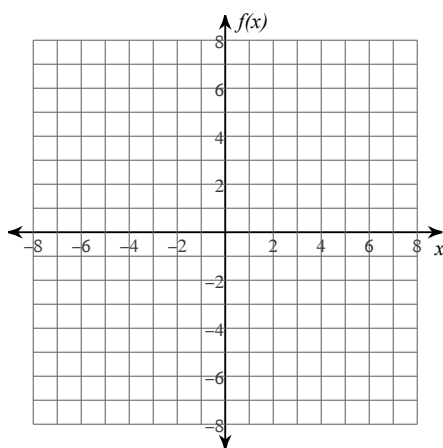
$$29) f(x) = \begin{cases} 2x - 3, & x \neq 2 \\ 5, & x = 2 \end{cases}; \text{ at } x = 2$$



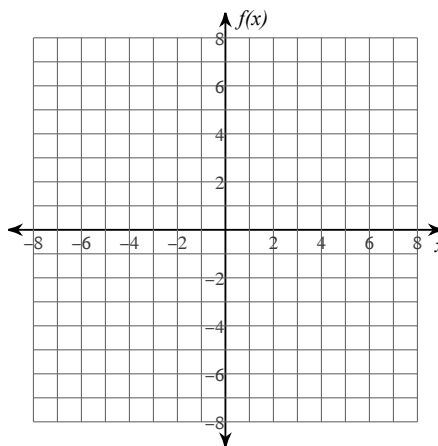
$$30) f(x) = -\frac{3}{x^2 + 1}; \text{ at } x = -1$$



$$31) f(x) = -x^3 - 3x^2 + 7; \text{ at } x = -2$$



$$32) f(x) = \frac{x - 1}{x^2 - x - 2}; \text{ at } x = -1 \text{ and } x = 2$$



Describe the transformations necessary to transform the graph of $f(x)$ into that of $g(x)$.

$$33) f(x) = x^3 \\ g(x) = (3x)^3 - 2$$

$$34) f(x) = \sqrt{x} \\ g(x) = 3\sqrt{x - 1}$$

$$35) f(x) = \frac{1}{x}$$

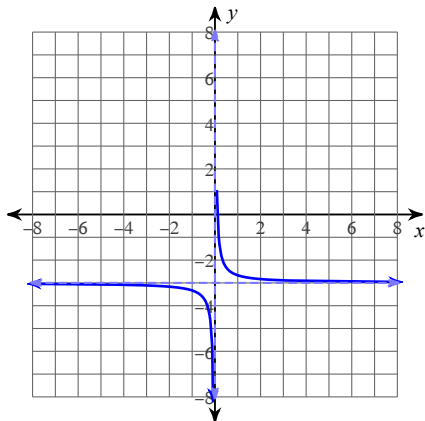
$$g(x) = -\frac{1}{x-3}$$

$$36) f(x) = \sqrt{x}$$

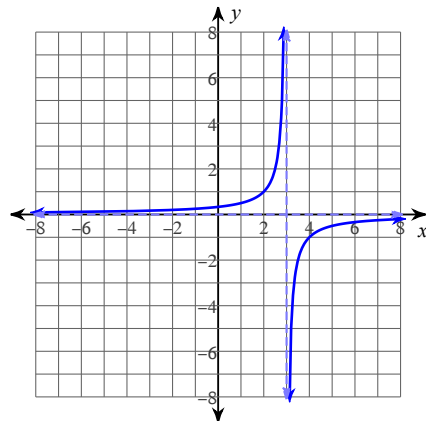
$$g(x) = -\sqrt{x} - 2$$

Identify the parent function $f(x)$ and write an equation for the function given.

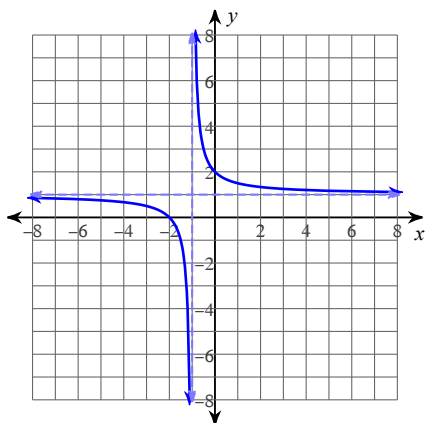
37)



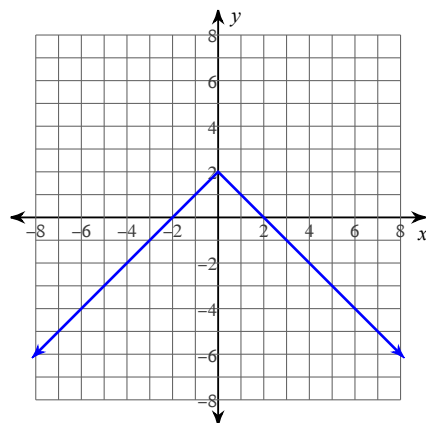
38)



39)



40)



Perform the indicated operation.

41) $f(x) = x + 3$
 $g(x) = x + 4$
 Find $(3f + 5g)\left(\frac{x}{2}\right)$

42) $g(n) = 2n + 3$
 $h(n) = n - 1$
 Find $(g - h)(-3n)$

43) $f(n) = 2n$
 $g(n) = n^2 + 4$
 Find $(f \circ g)(n + 4)$

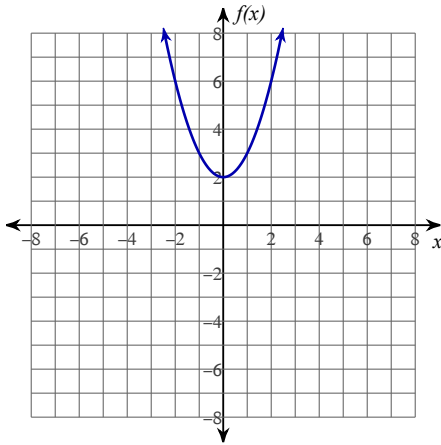
44) $g(x) = 2x + 1$
 $h(x) = 4x - 2$
 Find $g\left(\frac{x}{3}\right) + h\left(\frac{x}{3}\right)$

45) $g(x) = -x - 4$
 $h(x) = x^2 + 4x$
 Find $g(4x) + h(4x)$

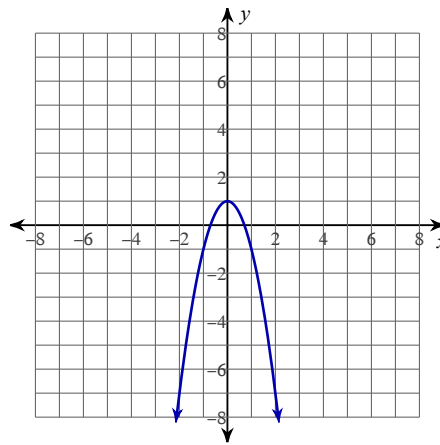
46) $f(a) = 3a - 3$
 $g(a) = a^3 + 2a$
 Find $(f - g)(-2a)$

For each problem, find the equation of the secant line that intersects the given points on the function.

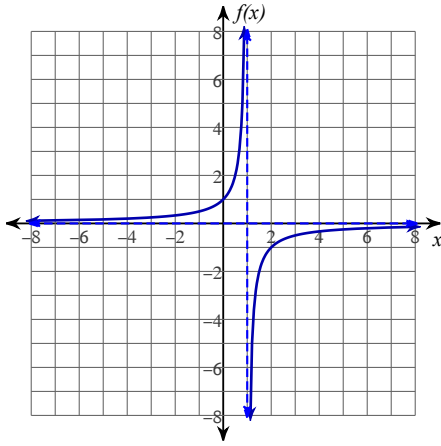
47) $f(x) = x^2 + 2$; $(1, 3), \left(\frac{4}{3}, \frac{34}{9}\right)$



48) $y = -2x^2 + 1$; $(-1, -1), \left(-\frac{1}{2}, \frac{1}{2}\right)$



$$49) f(x) = -\frac{1}{x-1}; \left(-1, \frac{1}{2}\right), \left(-\frac{1}{2}, \frac{2}{3}\right)$$



$$50) y = -\frac{1}{x+2}; \left(-1, -1\right), \left(-\frac{2}{3}, -\frac{3}{4}\right)$$

