

Extra Examples:

27. (8 points) The relationship between stopping distance,  $d$  (in feet) and the speed of the car,  $v$  (in mph) is  $d = 1.2v + 0.05v^2$  on dry level concrete.

a) How many feet will it take a car traveling at 50 mph to stop on dry, level concrete?

$$d = 1.2(50) + 0.05(50)^2 = \boxed{185 \text{ ft}}$$

b) If an accident occurs 250 feet ahead of you, what is the maximum speed you should be traveling to avoid being involved? Round your answer to the nearest two decimal places.

$$250 = 1.2v + 0.05v^2$$

$$0 = 0.05v^2 + 1.2v - 250$$

$$\boxed{59.72 \text{ mph}}$$

$$v = \frac{-1.2 \pm \sqrt{(1.2)^2 - 4(0.05)(-250)}}{2(0.05)}$$

$$v = \frac{-1.2 \pm \sqrt{51.44}}{0.1}$$

$$v = 59.72$$

$$v = -83.7$$

28. (8 points) Solve the equation.  $|5 - x| - 4 = 1$

$$+4 \quad +4$$

$$|5 - x| = 5$$

$$\begin{array}{r} 5 - x = 5 \\ -5 \quad -5 \end{array}$$

$$-x = 0$$

$$x = 0$$

$$\begin{array}{r} 5 - x = -5 \\ -5 \quad -5 \end{array}$$

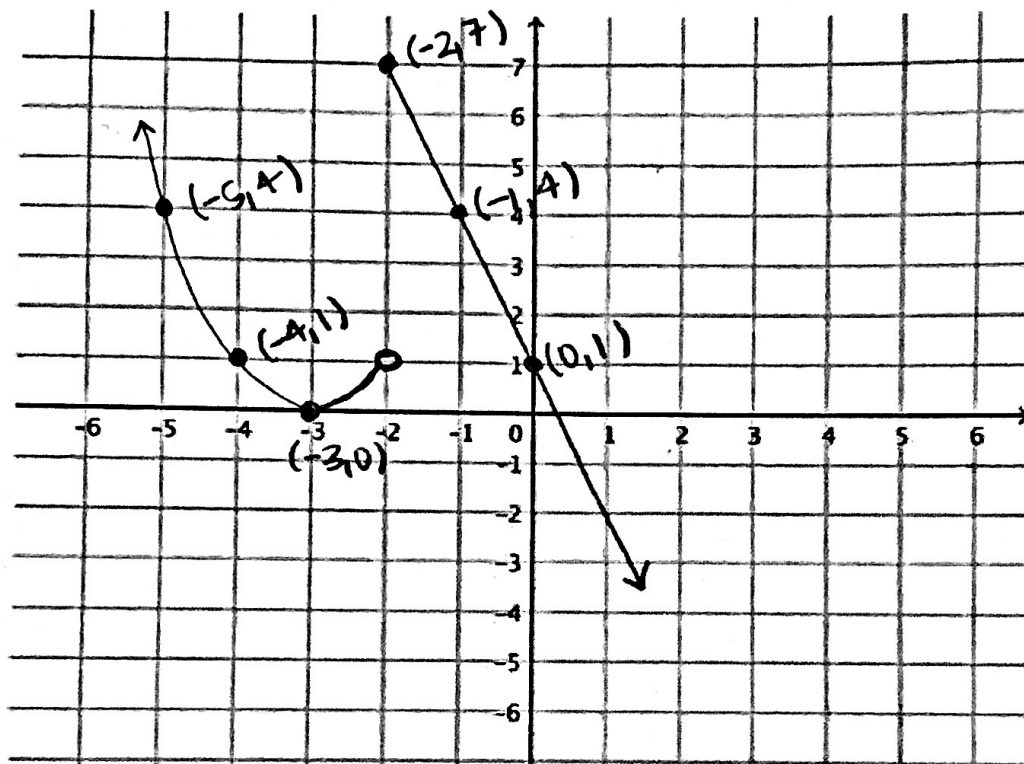
$$-x = -10$$

$$x = 10$$

$$\{0, 10\}$$

29. (8 points) Consider the piece-wise function  $f(x) = \begin{cases} (x+3)^2 & \text{if } x < -2 \\ -3x+1 & \text{if } x \geq -2 \end{cases}$

Graph the function. Be sure to mark and label three points for each piece of the function.



x	y
-3	0
-4	1
-5	4

30. (8 points) Solve the inequality. State the solution in interval notation.

$$\frac{4}{x+3} < \frac{3}{4x-2}$$

$$\frac{4}{x+3} - \frac{3}{4x-2} < 0$$

$$\frac{4(4x-2) - 3(x+3)}{(x+3)(4x-2)} < 0$$

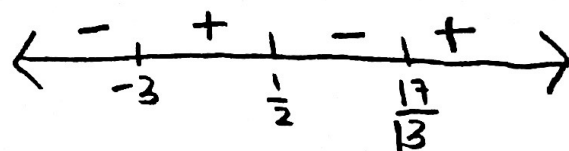
$$\frac{16x-8-3x-9}{(x+3)(4x-2)} < 0$$

$$\frac{13x-17}{(x+3)(4x-2)} < 0$$

$$x \neq -3, \frac{1}{2}$$

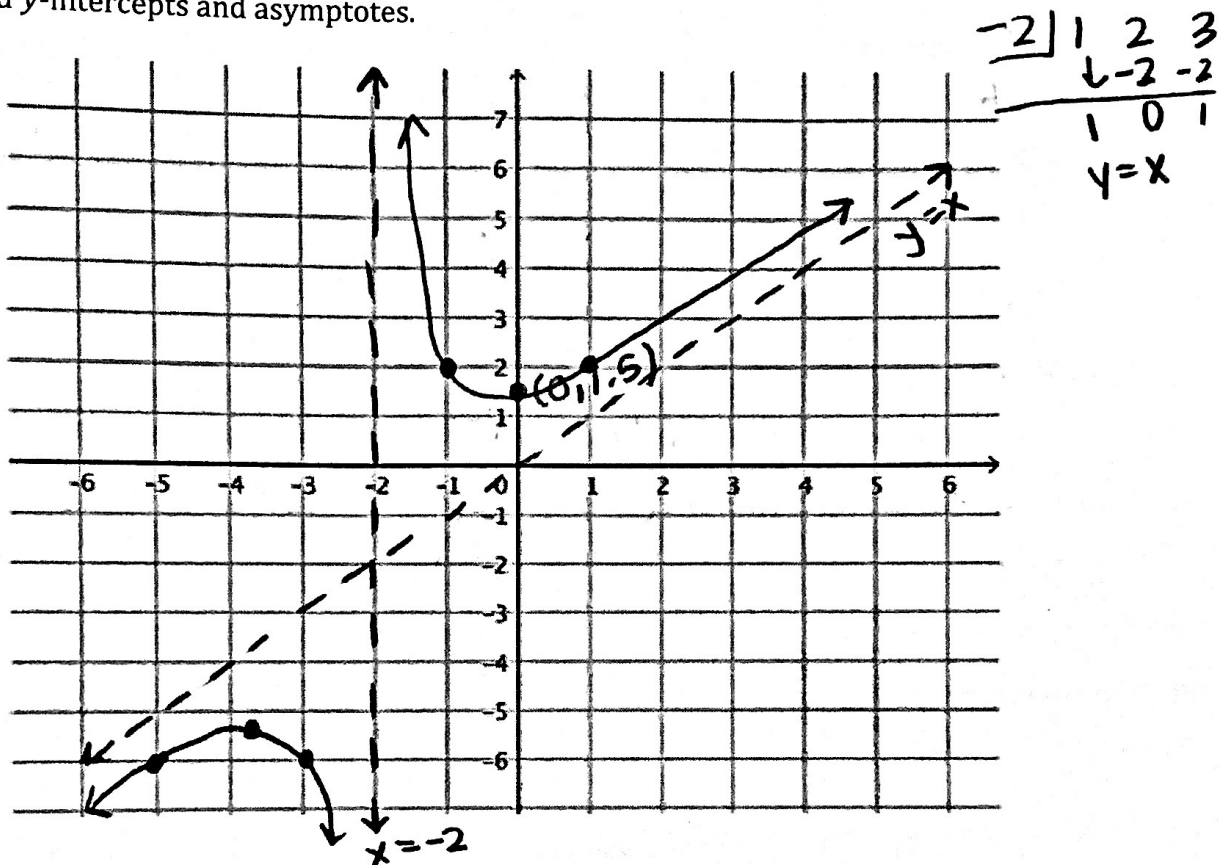
$$x\text{-int: } \frac{17}{13}$$

$$\boxed{(-\infty, -3) \cup (\frac{1}{2}, \frac{17}{13})}$$



$$\frac{x(x+2)}{x+2} + \frac{3}{x+2} = \frac{x^2+2x+3}{x+2}$$

31. (9 points) Graph the rational function  $f(x) = x + \frac{3}{x+2}$ . Your graph should clearly show and label all x and y-intercepts and asymptotes.



32. (3 points) Consider the piece-wise function  $g(x) = \begin{cases} -x-2 & \text{if } x < -2 \\ x^2-3 & \text{if } x \geq -2 \end{cases}$

The x-intercept(s) of  $g(x)$  is (are)  $(\sqrt{3}, 0)$ . Write your answer(s) as ordered pair(s)

$$0 = -x - 2$$

$$x = \cancel{-2}$$

$$0 = x^2 - 3$$

$$x^2 = 3$$

$$x = \sqrt{3}, -\sqrt{3}$$

33. (2 points) Consider the piece-wise function  $g(x) = \begin{cases} x-1 & \text{if } x \leq 0 \\ (x+2)^2 & \text{if } x > 0 \end{cases}$

Evaluate the following.

a)  $f(-5) = \underline{-6}$       $f(-5) = -5-1 = -6$

b)  $f(0) = \underline{-1}$       $f(0) = 0-1 = -1$

c)  $f(4) = \underline{36}$       $f(4) = (4+2)^2 = 6^2 = 36$

34. (3 points) Given the function  $f(x) = \frac{x^2+3x+2}{3x+7}$

a) Identify the domain of  $f(x)$ :  $\{x \mid x \neq -7/3\}$

b) Identify the  $x$ -intercept(s) of  $f(x)$ :  $(-1, 0)$   $(-2, 0)$

c) Identify the  $y$ -intercept of  $f(x)$ :  $(0, 2/7)$

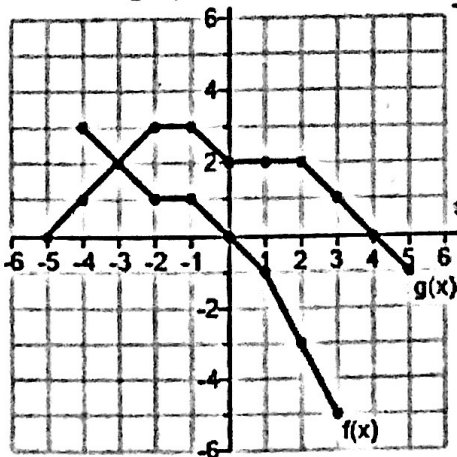
$$0 = x^2 + 3x + 2$$

$$0 = (x+1)(x+2)$$

35. (4 points) Write the difference quotient  $DQ = \frac{f(x+h)-f(x)}{h}$  for  $f(x) = \frac{5}{3x-2}$ . Do not simplify.

$$\frac{\frac{5}{3(x+h)-2} - \frac{5}{3x-2}}{h}$$

36. (3 points) Given the graph shown. Evaluate  $(f+g)(2) = \underline{-1}$



$$f(2) + g(2) = -3 + 2 = -1$$