

98.  $x^2 - 10x + 22 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(22)}}{2(1)}$$

$$= \frac{10 \pm \sqrt{100 - 88}}{2}$$

$$= \frac{10 \pm 2\sqrt{3}}{2} = 5 \pm \sqrt{3}$$

160.  $4\sqrt{x} - 3 = 0$

$$4\sqrt{x} = 3$$

$$16x = 9$$

$$x = \frac{9}{16}$$

Homework

p11 43

p12 78

p13 185

p23 54

p24 106

p58 70

180.

$$\frac{x}{x^2 - 4} + \frac{1}{x + 2} = 3$$

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

$$x + x - 2 = 3x^2 - 12$$

$$3x^2 - 2x - 10 = 0$$

$$x = \frac{1}{3} \pm \frac{\sqrt{31}}{3}$$

65.  $|x - 8| \leq 14$

$$-14 \leq x - 8 \leq 14$$

$$-6 \leq x \leq 22$$

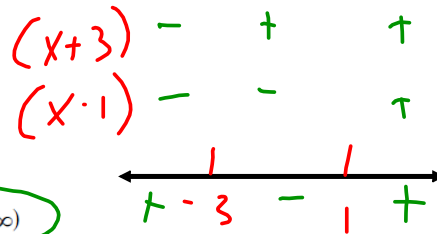
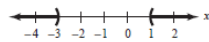
100.

$$x^2 + 2x > 3$$

$$x^2 + 2x - 3 > 0$$

$$(x + 3)(x - 1) > 0$$

Solution intervals:  $(-\infty, -3) \cup (1, \infty)$



105.

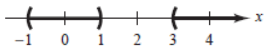
$$x^3 - 3x^2 - x + 3 > 0$$

$$x^2(x - 3) - 1(x - 3) > 0$$

$$(x^2 - 1)(x - 3) > 0$$

$$(x + 1)(x - 1)(x - 3) > 0$$

Solution set:  $(-1, 1) \cup (3, \infty)$



12.  $y = 3x^4 - 2x^2$

x-intercepts:  $0 = 3x^4 - 2x^2$

$$0 = x^2(3x^2 - 2)$$

$$x = 0 \text{ or } x = \pm\sqrt{\frac{2}{3}}$$

$$(0, 0), (-\sqrt{\frac{2}{3}}, 0), (\sqrt{\frac{2}{3}}, 0)$$

y-intercept:  $y = 3(0)^4 - 2(0)^2$

$$= 0$$

$$(0, 0)$$

$$x^3 - 3x^2 - x + 3 > 0$$

$$x^2(x-3) - 1(x-3) > 0$$

$$(x^2 - 1)(x-3) > 0$$

$$(x+1)(x-1)(x-3)$$

(x+1) - + +

(x-1) - - +

(x-3) - - +

- - 1 + 1 - 3 +

-2 + 1

-2 - 1

↙ ↘ -2 - 3

$$\frac{x}{x^2-4} + \frac{1}{x+2} = 3$$

$$\frac{x}{(x-2)(x+2)} + \frac{(x+1)}{(x+2)(x-2)} = \frac{3(x-2)(x+2)}{(x-2)(x+2)}$$

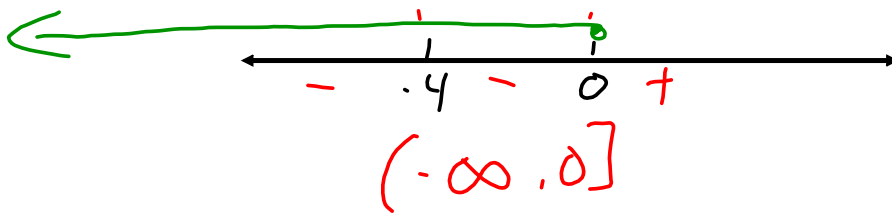
$$x + x + 1 = 3 \quad (x^2 - 2x + 1 + x^2 - 4)$$

$$x^3 + 8x^2 + 16x \leq 0$$

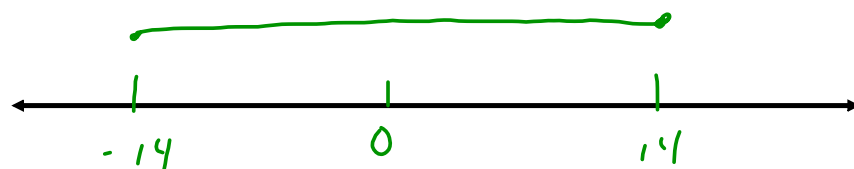
$$x(x^2 + 8x + 16) \leq 0$$

$$x(x+4)(x+4) \leq 0$$

$x$	-		-		+
$(x+4)^2$	+		+		+



$$65 \quad |x - 8| \leq 14$$



$$-14 \leq x - 8 \leq 14$$

43.  $\frac{3}{x^2 - 3x} + \frac{4}{x} = \frac{1}{x - 3}$  Multiply both sides by  $x(x - 3)$ .

$$3 + 4(x - 3) = x$$

$$3 + 4x - 12 = x$$

$$3x = 9$$

$$x = 3$$

A check reveals that  $x = 3$  is an extraneous solution, so there is no solution.

78.  $(x - 5)^2 = 30$

$$x - 5 = \pm\sqrt{30}$$

$$x = 5 \pm \sqrt{30} = -0.48, 10.48$$

185.  $|2x - 1| = 5$

$$2x - 1 = 5 \Rightarrow x = 3$$

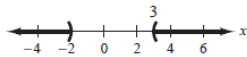
$$-(2x - 1) = 5 \Rightarrow x = -2$$

54.  $|1 - 2x| > 5$

$$1 - 2x < -5 \quad \text{or} \quad 1 - 2x > 5$$

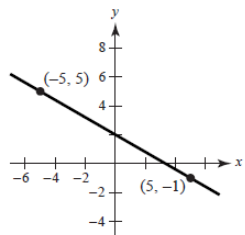
$$-2x < -6 \quad \quad -2x > 4$$

$$x > 3 \quad \quad x < -2$$



70.  $y = -\frac{3}{5}(x - 5) - 1$

$$y = -\frac{3}{5}x + 2$$



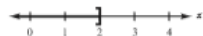
106.  $x^3 + 2x^2 - 4x - 8 \leq 0$

$$x^2(x + 2) - 4(x + 2) \leq 0$$

$$(x + 2)(x^2 - 4) \leq 0$$

$$(x + 2)^2(x - 2) \leq 0$$

Solution interval:  $(-\infty, 2]$



Homework

p24 102

p25 132

p44 16, 22

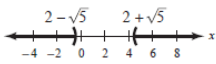
p 46 85-90

p 75 38, 52, 64

102.  $x^2 - 4x - 1 > 0$

$$x = \frac{4 \pm \sqrt{16 + 4}}{2} = 2 \pm \sqrt{5}$$

Solution intervals:  $(-\infty, 2 - \sqrt{5}) \cup (2 + \sqrt{5}, \infty)$



132.  $x^2 - 5x - 6 \geq 0$

$$(x + 1)(x - 6) \geq 0$$

By testing an  $x$ -value in each test interval in the inequality, we see that the domain set is:

$$(-\infty, -1] \cup [6, \infty)$$

22.  $y = \sqrt{9 - x^2}$

$$y = \sqrt{9 - (-x)^2}$$

$$y = \sqrt{9 - x^2}$$

$y$ -axis symmetry

85. False. 88. False.

86. True. 89. False.

87. True. 90. True.

38.  $q(t) = \frac{2t^2 + 3}{t^2}$

(a)  $q(2) = \frac{2(2)^2 + 3}{(2)^2} = \frac{8 + 3}{4} = \frac{11}{4}$

(b)  $q(0) = \frac{2(0)^2 + 3}{(0)^2}$

Division by zero is undefined.

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

16.  $9x^2 + 9y^2 = 144$

$x$ -intercepts:  $9x^2 + 9(0)^2 = 144$

$$9x^2 = 144$$

$$3x = \pm 12$$

$$x = \pm 4$$

$$(\pm 4, 0)$$

$y$ -intercepts:  $9(0)^2 + 9y^2 = 144$

$$9y^2 = 144$$

$$3y = \pm 12$$

$$y = \pm 4$$

$$(0, \pm 4)$$

Homework

p12 110

p23 57

p24 112

p74 24, 26

p75 53

p87 19, 21

p89 97, 100

52.  $f(x) = \frac{9 - x^2}{x + 1}$

$(x+1) \frac{9 - x^2}{x + 1} = 0 \quad (x+1)$

$9 - x^2 = 0$

$x^2 = 9$

$x = \pm 3$

64.  $s(y) = \frac{3y}{y + 5}$

$$y + 5 \neq 0$$

$$y \neq -5$$

The domain is all real numbers

$$y \neq -5.$$

$$9x^2 + 9y^2 = 144$$

x-intercept let  $y=0$   
y-intercept let  $x=0$

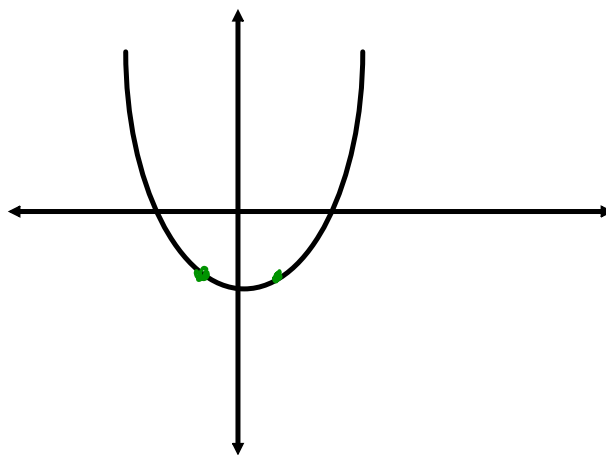
$$9x^2 + 9(0)^2 = 144$$
$$9x^2 = 144$$
$$x^2 = 36$$

$$x^2 = 36$$
$$\sqrt{x^2} = \sqrt{36}$$
$$|x| = 6$$

$$x^2 = 36$$
$$x^2 - 36 = 0$$

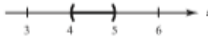


$x$  intercept  $f(x) = 0$  let  $y = 0$   
 $y$  intercept  $f(0)$  let  $x = 0$



110.  $3x + x^2 - 1 = 0$   
 $x^2 + 3x - 1 = 0$   
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$   
 $= \frac{-3 \pm \sqrt{3^2 - 4(1)(-1)}}{2(1)}$   
 $= \frac{-3 \pm \sqrt{13}}{2}$   
 $= -\frac{3}{2} \pm \frac{\sqrt{13}}{2}$

57.  $|9 - 2x| - 2 < -1$   
 $|9 - 2x| < 1$   
 $-1 < 9 - 2x < 1$   
 $-10 < -2x < -8$   
 $5 > x > 4$   
 $4 < x < 5$



112.  $2x^3 - x^4 \leq 0$   
 $x^3(2 - x) \leq 0$   
 Critical numbers:  $x = 0, x = 2$   
 Solution intervals:  $(-\infty, 0] \cup [2, \infty)$

24.  $y = \sqrt{x-5}$       26.  $|y| = 4 - x \Rightarrow y = \pm(4 - x)$   
 Yes,  $y$  is a function of  $x$ .      No,  $y$  is not a function of  $x$ .

53.  $f(x) = x^2 - 5x + 4$   
 $x^2 - 5x + 4 = 0$   
 $(x - 1)(x - 4) = 0$   
 $x - 1 = 0 \Rightarrow x = 1$   
 $x - 4 = 0 \Rightarrow x = 4$

19.  $f(x) = \frac{9x^2 - 4}{x}$       21.  $f(x) = \frac{1}{2}x^3 - 2x$   
 $\frac{9x^2 - 4}{x} = 0$        $\frac{1}{2}x^3 - 2x = 0$   
 $9x^2 - 4 = 0$        $x^3 - 4x = 0$   
 $x^2 = \frac{4}{9}$        $x(x^2 - 4) = 0$   
 $x = \pm\frac{2}{3}$        $x(x - 2)(x + 2) = 0$   
 $x = 0$  or  $x = \pm 2$

97.  $f(x) = x^6 - 2x^2 + 3$       100.  $f(x) = x\sqrt{1 - x^2}$   
 $f(-x) = (-x)^6 - 2(-x)^2 + 3$        $f(-x) = -x\sqrt{1 - (-x)^2}$   
 $= x^6 - 2x^2 + 3$        $= -x\sqrt{1 - x^2}$   
 $= f(x)$        $= -f(x)$   
 $f$  is even.      The function is odd.

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

$- (x\sqrt{1 - x^2})$

Homework

p44 14

p76 63, 68

p87 10, 23

p89 101, 103, 109

p107 43, 46