



$$d) |2x-3| \geq 5$$

$$\begin{array}{ll} 2x-3 \geq 5 & 2x-3 \leq -5 \\ 2x \geq 8 & 2x \leq -2 \\ x \geq 4 & x \leq -1 \end{array}$$



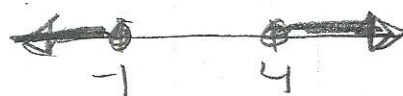
$$e) |3-2x| < 5$$

$$\begin{array}{ll} 3-2x < 5 & 3-2x > -5 \\ -2x < 2 & -2x > -8 \\ x > -1 & x < 4 \end{array}$$



$$f) |3-2x| \geq 5$$

$$\begin{array}{ll} 3-2x \geq 5 & 3-2x \leq -5 \\ -2x \geq 2 & -2x \leq -8 \\ x \leq -1 & x \geq 4 \end{array}$$



g) The solutions for (c) and (e) are the same as the results for (d) and (f) because  $2x-3 = -(3-2x)$  and  $|A| = |-A|$

On the number line the graphs for (a) and (b) and for (c) and (d) are complementary. For (a) and (c) and for (b) and (d) the difference between adding and subtracting 3 shows up as reversed opposites

$$\begin{array}{l} 4-67) \quad a) \quad 5-(y-3) = 3x \\ \quad \quad \quad -(y-3) = 3x-5 \\ \quad \quad \quad \underline{y-3 = -3x+5} \\ \quad \quad \quad \boxed{y = -3x+8} \end{array}$$

$$\begin{array}{l} b) \quad \frac{4(x+y)}{4} = \frac{-2}{4} \\ \quad \quad \quad x+y = -\frac{1}{2} \\ \quad \quad \quad \underline{-x \quad \quad -x} \\ \quad \quad \quad \boxed{y = -x - \frac{1}{2}} \end{array}$$

$$\begin{array}{l} 4-68) \quad a) \quad (y-3)^2 = 2y-10 \\ \quad \quad \quad y^2 - 6y + 9 - 2y + 10 = 0 \\ \quad \quad \quad \underline{y^2 - 8y + 19 = 0} \end{array}$$

$$\begin{array}{l} \sqrt{b^2-4ac} = \sqrt{64-4(1)(19)} \\ \quad \quad \quad = \sqrt{12} \quad \neq \end{array}$$

$$b) |y-3| = 2y-10$$

$$\begin{array}{l} y-3 = 2y-10 \\ \quad \quad \quad \underline{-y \quad \quad -y} \\ \quad \quad \quad -3 = y-10 \\ \quad \quad \quad \underline{+10 \quad \quad +10} \\ \quad \quad \quad \boxed{y = 7} \end{array}$$

$$\begin{array}{l} y-3 = -(2y-10) \\ y-3 = -2y+10 \\ \quad \quad \quad \underline{3y = 13} \\ \quad \quad \quad \boxed{y = \frac{13}{3}} \end{array}$$

$y = 13/3$  is extraneous



$$4-69) a) \frac{x-4}{2x^2+9x-5} + \frac{x+3}{x(x+5)}$$

$$AC = \begin{array}{r} -10 \\ 10 \quad -1 \end{array}$$

$$2x^2+10x-1x-5 \\ 2x(x+5)-1(x+5) \\ (2x-1)(x+5)$$

$$\frac{x}{x} \frac{x-4}{(2x-1)(x+5)} + \frac{x+3}{x(x+5)} \frac{(2x-1)}{(2x-1)}$$

$$\frac{x(x-4) + (x+3)(2x-1)}{x(2x-1)(x+5)} = \frac{x^2-4x+2x^2-x+6x-3}{x(2x-1)(x+5)}$$

$$\frac{3x^2+x-3}{x(2x-1)(x+5)} \leftarrow \text{Cannot factor}$$

$$b) \frac{4x^2-11x+6}{2x^2-x-6} - \frac{x+2}{2x+3}$$

$$AC = \begin{array}{r} 24 \\ -8 \quad -3 \end{array}$$

$$AC = \begin{array}{r} -12 \\ -4 \quad 3 \end{array}$$

$$\frac{4x^2-8x-3x+6}{2x^2-4x+3x-6} - \frac{(x+2)}{(2x+3)} = \frac{4x(x-2)-3(x-2)}{2x(x-2)+3(x-2)} - \frac{(x+2)}{(2x+3)}$$

$$\frac{(4x-3)(x-2)}{(2x+3)(x-2)} - \frac{x+2}{(2x+3)} = \frac{4x-3-(x+2)}{2x+3} = \frac{3x-5}{2x+3}$$

$$c) \frac{(x+4)(2x-1)(x-1)}{(x+5)(2x-1)(3x-4)} \cdot \frac{(x+8)(3x-4)}{(4x-3)(x-7)} = \boxed{\frac{x+4}{4x-3}}$$

$$d) \frac{2m^2+7m-15}{(m-4)(m+4)} \cdot \frac{(m-4)(m-2)}{2m^2-7m+6}$$

$$AC = \begin{array}{r} -30 \\ 10 \quad -3 \end{array}$$

$$\frac{2m^2+10m-3m-15}{(m-4)(m+4)} \cdot \frac{(m-4)(m-2)}{2m^2-4m-3m+6}$$

$$AC = \begin{array}{r} 12 \\ -4 \quad -3 \end{array}$$

$$\frac{2m(m+5)-3(m+5)}{(m-4)(m+4)} \cdot \frac{(m-4)(m-2)}{2m(m-2)-3(m-2)}$$

$$\frac{(2m-3)(m+5)}{(m-4)(m+4)} \cdot \frac{(m-4)(m-2)}{(2m-3)(m-2)} = \boxed{\frac{m+5}{m+4}}$$

$$4-70) \quad x^2 + 12x + 15 = 75$$

$$\quad \quad \quad -15 \quad -15$$

$$\frac{12}{2} = 6 \quad (6)^2 = 36$$

$$x^2 + 12x = 60$$

$$x^2 + 12x + 36 = 60 + 36$$

$$\sqrt{(x+6)^2} = \sqrt{96}$$

$$x+6 = \pm \sqrt{96} = \pm 4\sqrt{3 \cdot 2} = \pm 4\sqrt{6}$$

$$\begin{array}{ccccccc} -6 & & 2 & & 48 & & -6 \\ & & & & & & \\ & & & & 2 & & 24 \\ & & & & & & & & 12 \\ & & & & & & & & & & 6 \\ & & & & & & & & & & & 3 \end{array}$$

$$\boxed{x = -6 \pm 4\sqrt{6}}$$

$$4-71) \quad a) \quad bx + ax = x(b+a)$$

$$d) \quad \frac{(x-b)(x+b)}{x(x+b)} = \frac{(x-b)}{x}$$

$$b) \quad x + ax = x(1+a)$$

$$c) \quad \frac{a(x+1)}{(x+1)(x+1)} = \frac{a}{x+1}$$

$$4-72) \quad i) \quad y \geq \frac{1}{2}x - 3\frac{1}{2}$$

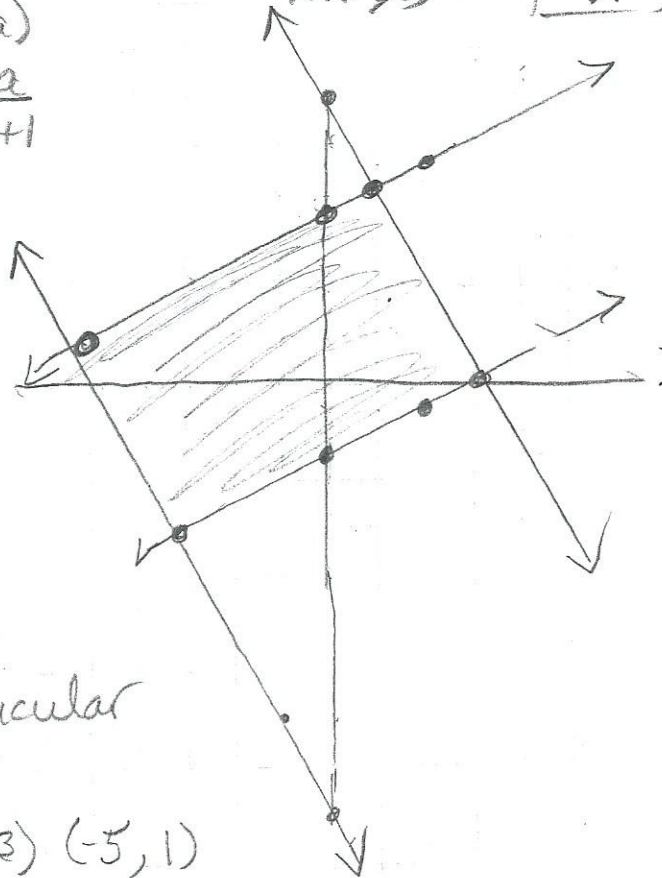
$$ii) \quad 2y \geq -x - 7$$

$$y \leq \frac{1}{2}x + 7\frac{1}{2}$$

$$iii) \quad y \leq -2x + 6$$

$$iv) \quad 2x + y \geq -9$$

$$y \geq -2x - 9$$



a) Rectangle; Perpendicular lines and slopes

$$b) \quad (1, 4) \quad (3, 0) \quad (-3, -3) \quad (-5, 1)$$



$$4-73) a) |x-4| < 9$$

$$x-4 < 9$$

$$x < 13$$

$$x-4 > -9$$

$$x > -5$$

$$\boxed{-5 < x < 13}$$

$$b) \left| \frac{1}{2}x - 45 \right| \geq 80$$

$$\frac{1}{2}x - 45 \geq 80$$

$$+45 \quad +45$$

$$2\left(\frac{1}{2}x\right) \geq (125) \cdot 2$$

$$x \geq 250$$

$$\frac{1}{2}x - 45 \leq -80$$

$$+45 \quad +45$$

$$\frac{1}{2}x \leq -35$$

$$x \leq -70$$

$$\boxed{x \geq 250 \text{ or } x \leq -70}$$

$$c) |2x-5| \leq 2$$

$$2x-5 \leq 2$$

$$2x \leq 7$$

$$x \leq 7/2$$

$$2x-5 \geq -2$$

$$2x \geq 3$$

$$x \geq 3/2$$

$$\boxed{3/2 \leq x \leq 7/2}$$

4-74)

$$S = 800 + 60M$$

$$E = 1200 + 40M$$

$$a) S = 800 + 60M$$

$$b) E = 1200 + 40M$$

$$c) \begin{array}{r} 800 + 60M = 1200 + 40M \\ -40 \qquad -40 \\ \hline 800 + 20M = 1200 \\ -800 \qquad -800 \\ \hline 20M = 400 \\ \frac{20M}{20} = \frac{400}{20} \end{array}$$

$$20M = 400$$

$$\frac{20M}{20} = \frac{400}{20}$$

$$M = 20$$

$$\boxed{M=20}$$

$$d) \frac{20}{4} = 5 \text{ years}$$

4-75) a)

$$x = 5 \text{ then } = 0$$

$$\frac{6(0)+8}{2} = 4 \Rightarrow \frac{4+11}{3} = \frac{15}{3} = 5$$

$$x=2 \text{ then } -3 \Rightarrow \frac{6(-3)+8}{2} = \frac{-10}{2} = -5 \text{ then } \frac{-5+11}{3} = 2$$

The  $x$  input equals the  $x$  output!

b) Replace  $x$  with  $c$

$$c-5 \Rightarrow \frac{6(c-5)+8}{2} = \frac{3c-15+4}{2} = \frac{3c-11}{2}$$

$$\frac{3c-11+11}{3} = c \quad \checkmark$$

$$4-76) a) \frac{(x-3)^2}{(2x-1)^2} \cdot \frac{\cancel{2x-1}}{\cancel{(3x+4)}(x+1)} \cdot \frac{\cancel{(x+6)}}{\cancel{(x-3)}} = \frac{x-3}{3x+4}$$

$$b) \frac{4x^2+5x-6}{3x^2+5x-2} \cdot \frac{6x^2-5x+1}{4x^2+x-3} \quad \begin{array}{l} AC = -24 \\ 6 \quad -3 \end{array} \quad \begin{array}{l} AC = 6 \\ -3 \quad -2 \end{array}$$

$$\frac{4x^2+8x-3x-6}{3x^2+10x-1x-2} \cdot \frac{6x^2-3x-2x+1}{4x^2+4x-3x-3} \quad \begin{array}{l} AC = 6 \\ -6 \quad -1 \end{array} \quad \begin{array}{l} AC = -12 \\ 4 \quad -3 \end{array}$$

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

$$\frac{\cancel{(4x-3)}\cancel{(x+2)}}{\cancel{(3x-1)}\cancel{(x+2)}} \cdot \frac{\cancel{(2x-1)}\cancel{(3x-1)}}{\cancel{(4x-3)}(x+1)} = \boxed{\frac{2x-1}{x+1}}$$

$$4-77) \quad \begin{array}{r} x^2 - x + 12 = 2x^2 + 3x + 7 \\ -x^2 \qquad \qquad -x^2 \end{array}$$

$$\begin{array}{r} -x + 12 = x^2 + 3x + 7 \\ +x \qquad \qquad +x \end{array}$$

$$\begin{array}{r} 12 = x^2 + 4x + 7 \\ -12 \qquad \qquad -12 \end{array}$$

$$\begin{array}{r} 0 = x^2 + 4x - 5 \\ 0 = (x+5)(x-1) \end{array}$$

$$\begin{array}{l} x = -5 \\ x = 1 \end{array}$$

$$y = (1)^2 - 1 + 12 = 12$$

$$\boxed{(1, 12)}$$

$$y = (-5)^2 - (-5) + 12 = 25 + 5 + 12 = 42$$

$$\boxed{(-5, 42)}$$

$$4-78) a) y = \frac{1}{2}x + b$$

$$1 = \frac{1}{2}(6) + b$$

$$1 = 3 + b$$

$$\begin{array}{r} -3 \quad -3 \end{array}$$

$$z = b$$

$$y = \frac{1}{2}x - 2$$

$$b) y = 2x + b$$

$$4 = 2(1) + b$$

$$2 = b$$

$$\boxed{y = 2x + 2}$$



Thursday 1/15 4.2.2 (4-83 → 4-89)

4-83) 
$$\begin{aligned} x + 2y &= 4 \\ 2x - y &= -7 \end{aligned}$$
$$x + y + z = -4$$
$$\begin{aligned} -2 + 3 + z &= -4 \\ -1 + z &= -4 \\ \boxed{z = -5} \end{aligned}$$

$$\begin{aligned} x + 2y &= 4 \\ 2(2x - y) &= -7 \end{aligned}$$
$$\begin{aligned} x + 2y &= 4 \\ 4x - 2y &= -14 \\ \hline 3x &= -10 \\ \frac{3x}{3} &= \frac{-10}{3} \\ \boxed{x = -\frac{10}{3}} \end{aligned}$$
$$\begin{aligned} -2 + 2y &= 4 \\ 2y &= 6 \\ \boxed{y = 3} \end{aligned}$$

Solve the system w/ x & y 1st then substitute into last equation to find z

4-84) a) 
$$\begin{aligned} 3x - 5 &\leq 7 \\ +5 \quad +5 \\ 3x &\leq 12 \\ \frac{3x}{3} &\leq \frac{12}{3} \\ x &\leq 4 \end{aligned}$$



b) 
$$\begin{aligned} x^2 + 6 &> 42 \\ -6 \quad -6 \\ \sqrt{x^2} &> \sqrt{36} \\ x &> 6 \\ x &< -6 \end{aligned}$$



4-85)  $3R = 2B + 2$

$3B = 4R + 2$

$$\begin{aligned} 3(3B - 2) &= 2B + 2 \\ 9B - 6 &= 2B + 2 \\ -2(4B - 8) &= -2 \end{aligned}$$

$$\begin{aligned} 9R - 6B &= 6 \\ -8R + 6B &= 4 \\ \hline \boxed{R = 10 \text{ cm}} \end{aligned}$$

$$\begin{aligned} 3(10) &= 2B + 2 \\ 30 &= 2B + 2 \\ 28 &= 2B \\ \frac{28}{2} &= \frac{2B}{2} \end{aligned}$$

$$\boxed{B = 14 \text{ cm}}$$





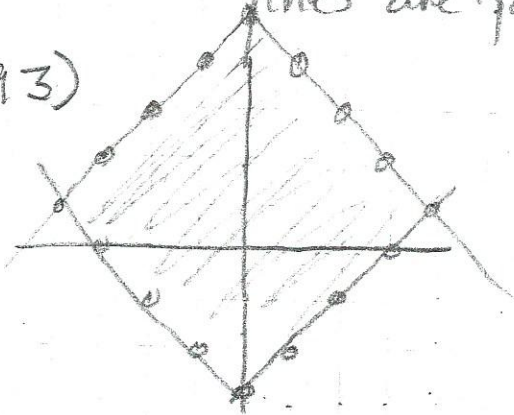
Friday 1/16 4.2.3 (4-92 → 4-97)

4-92) 
$$\begin{cases} 3x+2=y \\ -9x+3y=11 \end{cases}$$

$$\begin{aligned} -9x+3(3x+2) &= 11 \\ -9x+9x+6 &= 11 \\ 6 &\neq 11 \end{aligned}$$

No solution, the lines are parallel

4-93)



a) Square - perp. slopes and all sides equal

b)  $(0, -3)$   $(0, 5)$   
 $(4, 1)$   $(-4, 1)$

c) side =  $\sqrt{4^2+4^2} =$

$$= \sqrt{32}$$
  
$$A = s \cdot s = \sqrt{32} \cdot \sqrt{32} = \underline{\underline{32 \text{ square units}}}$$

4-94) a) 
$$\begin{aligned} 3(x+2) &> 4x-7 \\ 3x+6 &> 4x-7 \\ -x+6 &> -7 \\ -6 & \quad -6 \\ -x &> -13 \\ \frac{-x}{-1} & \quad \frac{-13}{-1} \\ x &< 13 \end{aligned}$$



b) 
$$\begin{aligned} 3x^2-4x+2 &\leq x^2+x+6 \\ -x^2 & \quad -x^2 \\ 2x^2-4x+2 &\leq x+6 \\ -x & \quad -x \\ 2x^2-5x+2 &\leq 6 \\ -4 & \quad -6 \\ 2x^2-5x-4 &\leq 0 \end{aligned}$$

$$\frac{5 \pm \sqrt{25-4(2)(-4)}}{4}$$

$$\frac{5 \pm \sqrt{25+32}}{2}$$

$$\frac{5 \pm \sqrt{57}}{4}$$



$$-1.6 \leq x \leq 3.1$$

$$4-95) a) (\sqrt{x+15})^2 = (5+\sqrt{x})^2$$

$$x+15 = 25 + 10\sqrt{x} + x$$

$$15 = 25 + 10\sqrt{x}$$

$$-\frac{10}{10} = \frac{10\sqrt{x}}{10}$$

$$\sqrt{x} \neq -1$$

$$b) (y-6)^2 + 10 = 3y$$

$$y^2 - 12y + 36 + 10 = 3y$$

$$y^2 - 15y + 46 = 0$$

$$\frac{-15 \pm 6.4}{2} = \boxed{\begin{matrix} 4.3 \text{ and} \\ 10.7 \end{matrix}}$$

$$\frac{-15 \pm \sqrt{225 - 4(46)}}{2}$$

$$\frac{-15 \pm \sqrt{225 - 184}}{2}$$

$$\frac{-15 \pm \sqrt{41}}{2}$$

$$4-96) \begin{cases} x + 3y = 16 \\ -1(x - 2y = 31) \end{cases}$$

$$(25, -3)$$

$$\begin{cases} x + 3y = 16 \\ -x + 2y = -31 \end{cases}$$

$$\frac{5y}{5} = \frac{-15}{5}$$

$$y = -3$$

$$\begin{aligned} x - 2(-3) &= 31 \\ x + 6 &= 31 \\ x &= 25 \end{aligned}$$

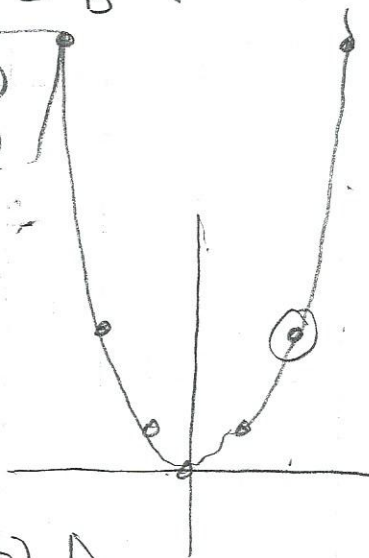
$$a) \begin{cases} x^2 + 3y = 16 \\ -1(x^2 - 2y = 31) \end{cases}$$

$$y = -3$$

$$\begin{aligned} x^2 - 2(-3) &= 31 \\ x^2 + 6 &= 31 \\ x^2 &= 25 \\ x &= \pm 5 \end{aligned}$$

$$b) 5y = -15$$

$$\boxed{\begin{matrix} (5, -3) \\ (-5, 3) \end{matrix}}$$



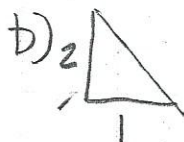
$$\begin{matrix} (2, 4) \\ (-4, 16) \end{matrix}$$

$$m = \frac{16 - 4}{-4 - 2} = \frac{12}{-6} = -2$$

$$\begin{aligned} y &= 2x + b \\ 4 &= 2(2) + b \\ 4 &= -4 + b \\ &= b \end{aligned}$$

$$4-97) y = x^2$$

x	y
0	0
1	1
2	4
3	9
4	16



$$\tan^{-1} \frac{2}{1} = \boxed{63.4^\circ}$$

$$\boxed{y = -2x + 8}$$