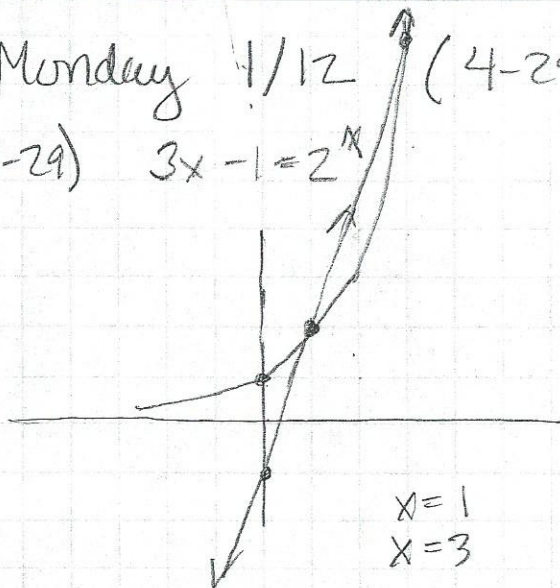


Monday 1/12 (4-29 → 4-35)

4-29) $3x - 1 = 2^x$



$y = 2^x$

$y = 3x - 1$

x	y
0	1
1	2
2	4
3	8

x	y
0	-1
1	2
2	5
3	8

Cannot solve algebraically

4-30) $f(x) = \frac{1}{2}(x-2)^3 + 1$
 $g(x) = 2x^2 - 6x - 3$

a) $x \neq 0$
 $x = 4$

$\frac{1}{2}(0-2)^3 + 1 = \frac{1}{2}(-8) + 1 = -4 + 1 = -3$
 $2(0)^2 - 6(0) - 3 = -3$ ✓

$\frac{1}{2}(4-2)^3 + 1 = 4 + 1 = 5$ ✓
 $2(4)^2 - 6(4) - 3 = 32 - 24 - 3 = 5$ ✓

b) $x = 6$ is also a solution

$\frac{1}{2}(6-2)^3 + 1 = 32 + 1 = 33$ ✓
 $2(6)^2 - 6(6) - 3 = 72 - 36 - 3 = 33$ ✓

c) $\frac{1}{2}(x-2)^3 + 1 = 0$
 $(2) \frac{1}{2}(x-2)^3 = -1 (2)$
 $\sqrt[3]{(x-2)^3} = \sqrt[3]{-2}$
 $(x-2) = -1.26$
 $+2 \quad +2$
 $x = 0.74$

pt c is on the cubic

vertex $-\frac{(-6)}{2(2)} = \frac{6}{4} = \frac{3}{2}$
 $y = 2\left(\frac{3}{2}\right)^2 - 6\left(\frac{3}{2}\right) - 3$
 $2\left(\frac{9}{4}\right) - \frac{18}{2} - 3$
 $-\frac{9}{2} + \frac{-6}{2} = -\frac{15}{2}$

d) $f(x)$
 D: all real #'s
 R: all real #'s

$g(x)$
 D: all real #'s
 R: $y \geq -7.5$ ✓

$$4-31) a) 2(x+3)^2 - 5 = -5$$

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

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

$$\boxed{x = -3}$$

$$b) 3(x-2)^2 + 6 = 9$$

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

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

$$x-2 = \pm 1$$

$$\boxed{\begin{array}{l} x = 2+1 = 3 \\ x = 2-1 = 1 \end{array}}$$

$$c) |2x-5| - 6 = 15$$

$$|2x-5| = 21$$

$$2x-5 = 21$$

$$\frac{2x}{2} = \frac{26}{2}$$

$$\boxed{x = 13}$$

$$2x-5 = -21$$

$$\frac{2x}{2} = \frac{-16}{2}$$

$$\boxed{x = -8}$$

$$d) 3\sqrt{5x-2} + 1 = 7$$

$$\frac{3\sqrt{5x-2}}{3} = \frac{6}{3}$$

$$(\sqrt{5x-2})^2 = (2)^2$$

$$5x-2 = 4$$

$$\frac{5x}{5} = \frac{6}{5}$$

$$\boxed{x = \frac{6}{5} = 1.2}$$

$$4-32) a) 5x - 3y = 12$$

$$\begin{array}{r} -5x \\ -3y = -5x + 12 \\ -3 \end{array}$$

$$\boxed{y = \frac{5}{3}x - 4}$$

$$b) (r^2)F = \frac{Gm_1 m_2}{r^2} (r^2)$$

$$\frac{r^2 F}{Gm_1} = \frac{Gm_1 m_2}{Gm_1}$$

$$\boxed{m_2 = \frac{r^2 F}{Gm_1}}$$

$$c) E = \frac{1}{2}mv^2 (2)$$

$$\frac{2E}{v^2} = \frac{mv^2}{v^2}$$

$$\boxed{m = \frac{2E}{v^2}}$$

$$d) (x-4)^2 + (y-1)^2 = 10$$

$$\sqrt{(y-1)^2} = \sqrt{10 - (x-4)^2}$$

$$y-1 = \sqrt{10 - (x-4)^2}$$

$$\boxed{y = \sqrt{10 - (x-4)^2} + 1}$$

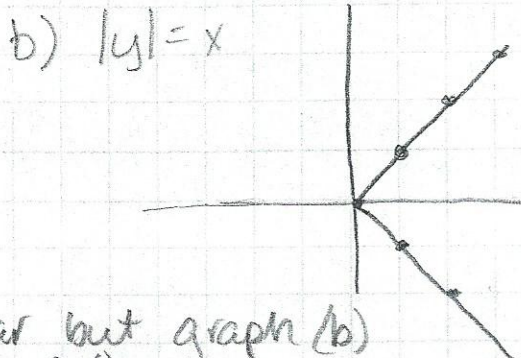
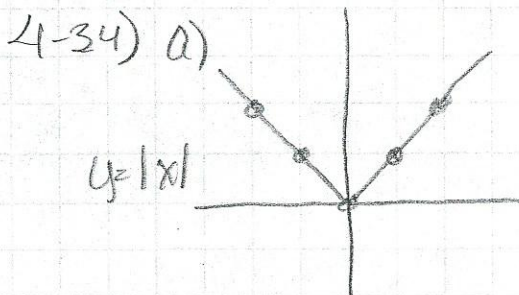
$$4-33) (a+b)^2 \stackrel{?}{=} (a^2+b^2) \quad \text{or}$$

$$a^2+2ab+b^2 \neq a^2+b^2$$

Sub numbers

$$(1+2)^2 \stackrel{?}{=} (1^2+2^2)$$

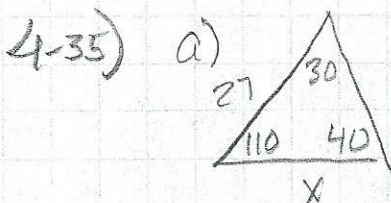
$$9 \neq 1+4$$



c) The graphs are similar but graph (b) is graph (a) rotated 90°

d) a) D: all real #'s
R: $y \geq 0$

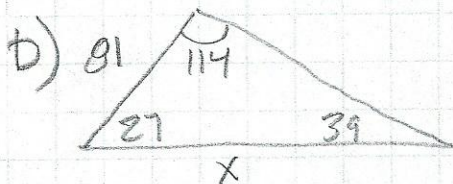
b) D: $x \geq 0$
R: all real #'s



~~$$\frac{\sin 40}{27} = \frac{\sin 30}{x}$$~~

$$\frac{x \sin 40}{\sin 40} = \frac{27 \sin 30}{\sin 40}$$

$$x = 21$$



$$180 - 39 - 27 = 114$$

~~$$\frac{\sin 39}{81} = \frac{\sin 114}{x}$$~~

$$\frac{x \sin 39}{\sin 39} = \frac{81 \sin 114}{\sin 39}$$

$$x = \frac{81 \sin 114}{\sin 39}$$

$$x = 117.58$$

$$d) \quad y = 3(x-2)^2 + 3$$

$$y = 6x - 12$$

$$x = 3$$

$$y = 6(3) - 12$$

$$18 - 12$$

$$y = 6$$

$$3(x^2 - 4x + 4) + 3 = 6x - 12$$

$$3x^2 - 12x + 12 + 3 - 6x + 12 = 0$$

$$3x^2 - 18x + 27 = 0$$

$$3(x^2 - 6x + 9) = 0$$

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

$$(3, 6)$$

The line is tangent to the parabola

$$441) \quad a) \quad 3(y+1)^2 - 5 = 43$$

$$3(y+1)^2 = \frac{48}{3}$$

$$\sqrt{(y+1)^2} = \sqrt{16}$$

$$y+1 = \pm 4$$

$$y = 5 \quad \text{or} \quad y = 3$$

$$b) \quad (\sqrt{1-4x})^2 = (10)^2$$

$$1-4x = 100$$

$$-4x = 99$$

$$\frac{-4x}{-4} = \frac{99}{-4}$$

$$x = -99/4$$

$$c) \quad \frac{6y-1}{6} - 3 = 2$$

$$y \quad +3 \quad +3$$

$$6y - 1 = 5$$

$$+1 \quad +1$$

$$\frac{6y}{6} = \frac{6}{6}$$

$$y = 1$$

$$d) \quad (\sqrt[3]{1-2x})^3 = (3)^3$$

$$1-2x = 27$$

$$-1 \quad -1$$

$$-2x = 26$$

$$\frac{-2x}{-2} = \frac{26}{-2}$$

$$x = -13$$

4-42) a) $t(n) = 1, 4, 7, 10$

explicit $t(n) = 3n - 2$
 rec. $t(n+1) = t(n) + 3$

b) $t(n) = 3, 3/2, 3/4, 3/8$

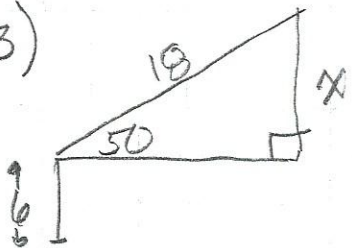
explicit $t(n) = 3(\frac{1}{2})^{n-1}$
 rec $t(n+1) = t(n) \cdot 1/2$

c) $\frac{3-17}{3-1} = \frac{-14}{2} = -7$ $t(n) = -7n + 10$ $t(0) = 10$

d) $\frac{8.64}{7.2} = 1.2$ $t(n) = 5(1.2)^n$

e) $\frac{116 - 1056}{12 - 7} = \frac{-940}{5} = -188$ to get to $t(1)$
 $t(n) = -188n + 2376$ add $(188)(7) + 1056$
 $t(4) = -188(4) + 2376 = 1620$

4-43)



$\sin 50 = \frac{x}{18}$

$x = 18 \sin 50$
 $x = 13.8$

Total = $13.8 + 6 = 19.79$ feet

4-44) a) $y = -6/5x - 7$ $m = -6/5$ $b = (0, -7)$

b) $3x - 2y = 10$
 $\frac{-2y}{-2} = \frac{-3x + 10}{-2}$

$y = 3/2x - 5$
 $m = 3/2$ $b = (0, -5)$

c) $m = \frac{4 - (-2)}{(8-5)} = \frac{6}{3} = 2$

$m = 2$ $b = (0, -12)$

$y = 2x + b$
 $4 = 2(8) + b$
 $4 - 16 = b$
 $-12 = b$

4-45) a) Not a function
 D: $-3 \leq x \leq 3$
 R: $-3 \leq y \leq 3$

b) is a function
 D: $-2 \leq x \leq 3$
 R: $-2 \leq y \leq 2$

4-46) $2^{(x+y)} = 16$ $2^{(2x+y)} = \frac{1}{8}$
 $2^{(x+y)} = 2^4$ $2^{(2x+y)} = 2^{-3}$

$x+y=4$
 $y=4-x$

$2x+y=-3$

$2x + 4 - x = -3$

$y=4-(-7)$
 $y=11$

$x+4=-3$

$-4 -4$

$x=-7$

$(-7, 11)$

Friday 1/9 4.1.4 (4-51 \rightarrow 4-57)

4-51)

$4c + 5p = 32$
 $-4(1c + 8p = 35)$
 $-4c - 32p = -140$

 $-27p = -108$
 $-27 \quad -27$
 $p = 4$

$4c + 5(4) = 32$
 $4c + 20 = 32$
 $\frac{4c}{4} = \frac{12}{4}$
 $c = 3$

Cylinders = 3 oz
 Prisms = 4 oz

4-52)

$2x^2 + 5x - 3 \leq x^2 + 4x + 3$

$x^2 + 5x - 3 \leq 4x + 3$

$x^2 + x - 3 \leq 3$

If $x=5$ $25-5-6 \neq 0$ NO

$x^2 + x - 6 \leq 0$

$(x+3)(x-2) \leq 0$

If $x=-1$ then (yes)

$1 - (-1) - 6 \leq 0$
 $-4 \leq 0$ ✓

Any value $-3 \leq x \leq 2$

$$4-53) \quad a) \quad \begin{array}{r} 5 - 3\left(\frac{1}{2}x + 2\right) = -7 \\ -5 \qquad -5 \end{array} \qquad \begin{array}{r} \frac{1}{2}x + 2 = 4 \\ -2 \quad -2 \end{array}$$

$$\qquad \qquad \begin{array}{r} -3\left(\frac{1}{2}x + 2\right) = -12 \\ -3 \qquad -3 \end{array} \qquad \begin{array}{r} 2\left(\frac{1}{2}x\right) = 2(2) \\ \boxed{x = 4} \end{array}$$

$$b) \quad \begin{array}{r} 5\left(\frac{\sqrt{x-2} + 1}{5}\right) = \frac{15}{5} \\ \sqrt{x-2} + 1 = 3 \\ -1 \quad -1 \end{array} \qquad \begin{array}{r} (\sqrt{x-2})^2 = (2)^2 \\ x-2 = 4 \\ +2 \quad +2 \\ \boxed{x = 6} \end{array}$$

$$c) \quad \begin{array}{r} 12 - \left(\frac{2x}{3} + x\right) = 2 \\ -12 \qquad -12 \\ -\left(\frac{2x}{3} + x\right) = -10 \\ -1 \qquad -1 \\ \frac{2x}{3} + x = 10 \\ \frac{2x}{3} + \frac{3x}{3} = 10 \end{array} \qquad \begin{array}{r} \frac{3}{5}\left(\frac{5x}{3}\right) = 10\left(\frac{3}{5}\right) \\ \boxed{x = 6} \end{array}$$

$$d) \quad \begin{array}{r} -3\left(\frac{2x+1}{-3}\right)^3 = \frac{-192}{-3} \\ \sqrt[3]{(2x+1)^3} = \sqrt[3]{64} \\ 2x+1 = 4 \\ -1 \quad -1 \end{array} \qquad \begin{array}{r} \frac{2x}{2} = \frac{3}{2} \\ \boxed{x = 3/2} \end{array}$$

$$4-54) \quad y = x^2 - 8x + 10$$

$$a) \quad \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(10)}}{2} = \frac{8 \pm \sqrt{64 - 40}}{2}$$

$$\frac{8 \pm \sqrt{20}}{2} = \frac{8 \pm 2\sqrt{5}}{2} = 4 \pm \sqrt{5}$$

$$\frac{4 + \sqrt{5} + 4 - \sqrt{5}}{2} = \frac{8}{2} = 4$$

$$y = (4)^2 - 8(4) + 10 = 16 - 32 + 10 = -6$$

vertex (4, -6)

$$b) \quad \begin{array}{l} y = (x^2 - 8x + 16) + 10 - 16 \\ y = (x - 4)^2 - 6 \end{array}$$

$$V(4, -6)$$

$$\left(\frac{3}{2}, -4\right)$$

$$c) \quad y = x^2 - 3x$$

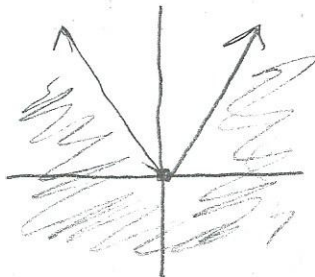
$$y = x(x - 3)$$

$$\begin{array}{l} x = 0 \\ x = 3 \end{array}$$

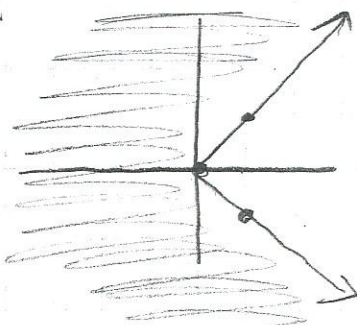
$$\frac{3+0}{2} = \frac{3}{2}$$

$$y = \frac{3}{2}\left(\frac{3}{2} - 0\right) = -\frac{9}{4}$$

4-55) a) $y \leq |x|$



b) $|y| \geq x$



x	y
0	0
1	-1
1	1

4-56) $y < |x-3|$ (B)

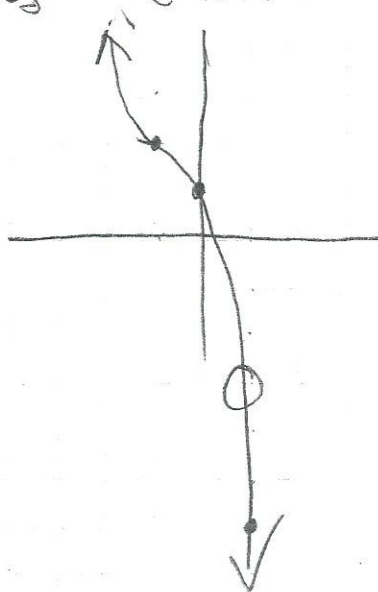
$5 < |-4-3|$

$5 < |-7|$

$5 < 7 \checkmark$

4-57) $y_3 = -(x+1)^3 + 2$

a)



PT of inflection
 $(-1, 2)$

x	y
0	1
1	-6
-1	2

b) $-3 = -(x+1)^3 + 2$

$\sim 1,7 = x$