Thurs 11/6 2.1.5 (2-69 → 2-75)

2-69) $v(60, 50)$ $y = a(x-60)^2 + 50$

solve for a

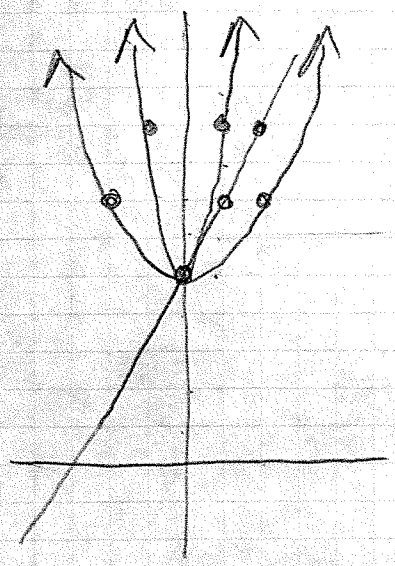
$(120, 0)$ $0 = a(120-60)^2 + 50$

$-50 = a(60)^2$

$\frac{-50}{3600} = \frac{3600a}{3600}$ $a = \frac{-5}{360} = -\frac{1}{72}$

$y = -\frac{1}{72}(x-60)^2 + 50$

2-70)



a) It is the slope

b) No, only lines have constant slope. The 2 is the stretch factor

2-71) a) No, Because there is only one height for each x or because it takes bigger x-values to get bigger y-values.

b) No, Because the domain is unlimited, any # can be squared

2-72) a) $324 = ab^4$ $9 = ab^2$

$a = \frac{324}{b^4}$ $a = \frac{9}{b^2}$

$\frac{324}{b^4} = \frac{9}{b^2}$

$\frac{324b^2}{b^2} = \frac{9b^4}{b^2}$

$\frac{324}{9} = \frac{9b^2}{9}$

$\sqrt{36} = \sqrt{b^2}$

$b = 6$

$a = \frac{9}{36} = .25$

$y = .25(6)^x$

2-72 cont'd

b) $40 = ab^{-1}$ $\quad 12 = ab^{0}$

$a = \frac{40}{b^{-1}}$ $\quad a = 12$

$a = 40b$ $\quad \frac{12}{40} = \frac{40b}{40}$ $\quad b = \frac{12}{40} = \frac{3}{10} = .3$

$y = 12(.3)^x$

2-73) a) $y = 2x^2 + 3x - 5$ $\quad A \cdot C = -10$ $\quad 5x \; -2x$

$2x^2 + 5x - 2x - 5 = 0$

$x(2x+5) - 1(2x+5) = 0$

~~x-int~~ $(-\frac{5}{2}, 0)$ $\quad (x-1)(2x+5) = 0$

$(1, 0)$ $\quad x = 1$ $\quad 2x + 5 = 0$

$-5 \quad -5$

$\frac{2x}{2} = \frac{-5}{2}$ $\quad x = -5/2$

y-int: $y = 0 + 0 - 5$ $\quad (0, -5)$

$y = +5$

b) $y = \sqrt{2x-4}$ $\quad$ x-int $(2, 0)$

$0 = \sqrt{2x-4}$ $\quad$ y-int None

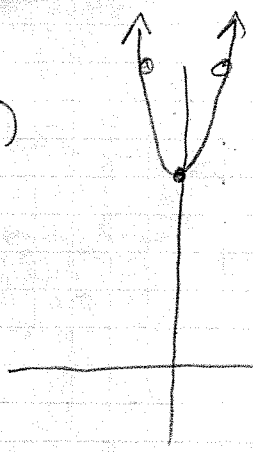
$0 = 2x - 4$ $\quad y = \sqrt{0-4}$ undefined

$+4 \quad +4$

$\frac{4}{2} = \frac{2x}{2}$

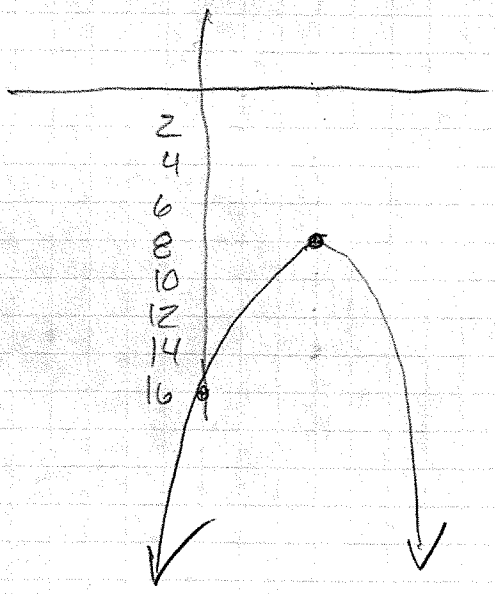
$2 = x$

2-74) a)



vertex (0, 5)
stretched parabola

b) vertex (3, -7)
inverted parabola



2-75) $g(x) = x^2 - 5$

a) $\underset{+5}{20} = x^2 \underset{+5}{-5}$

$\sqrt{25} = \sqrt{x^2}$

$\boxed{x = \pm 5}$

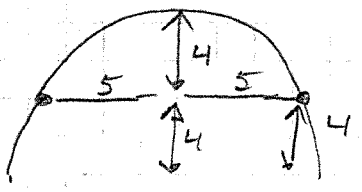
b) $\underset{+5}{6} = x^2 \underset{+5}{-5}$

$\sqrt{11} = \sqrt{x^2}$

$\boxed{x = \pm\sqrt{11}}$

Wed 11/12 Lesson 2.2.1 (2-81 → 2-87)

2-81) max (5, 8) standing @ 0, 0



$y = a(x-h)^2 + k$

$y = a(x-5)^2 + 8$

solve for a: $4 = a(10-5)^2$

$4 = 25a + 8$

$-8 \quad -8$

$\frac{-4}{25} = \frac{25a}{25}$ $\quad a = \frac{-4}{25}$

$\boxed{y = \frac{-4}{25}(x-5)^2 + 8}$

domain: $0 \le x \le 10$

range: $4 \le y \le 8$

2-82) $y = 2x^2 + 3x + 1$ $\quad A \cdot C = 2$ (2x, 1x)

a) $y = 2x^2 + 2x + 1x + 1$

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

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

x int: $2x + 1 = 0$

$-1 \quad -1$

$\frac{2x}{2} = \frac{-1}{2}$ $\quad \boxed{x = -1/2}$

$x + 1 = 0$

$-1 \quad -1$

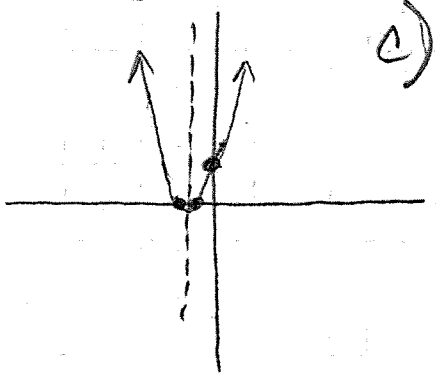
$\boxed{x = -1}$

$\boxed{(-\frac{1}{2}, 0)}$ $\boxed{(-1, 0)}$

y int: $y = 2(0)^2 + 3(0) + 1$

$y = 1$

(0, 1)



c) $v: \frac{-b}{2a} = \frac{-3}{2(2)} = \frac{-3}{4}$

$y = 2\left(\frac{-3}{4}\right)^2 + 3\left(\frac{-3}{4}\right) + 1$

$y = 2\left(\frac{9}{16}\right) - \frac{9}{4} + 1 = \frac{9}{8} - \frac{18}{8} + \frac{8}{8}$

$y = \frac{-1}{8}$

or $(-3/4, -1/8)$

b) axis of symmetry $= \frac{-b}{2a} = \frac{-3}{4}$

2-83) move the y-coordinate of the vertex $(-\frac{3}{8})$ up $\frac{1}{8}$ units so the vertex is on the x-axis @ $(-3/4, 0)$ (0.125)

$y = 2x^2 + 3x + 1.125$

2-84) a) $\sqrt{24} = \sqrt{2\cdot2\cdot2\cdot3} = \boxed{2\sqrt{6}}$

(24 → 2, 12 → 2, 6 → 2, 3)

b) $\sqrt{18} = \sqrt{2\cdot3\cdot3} = \boxed{3\sqrt{2}}$

(18 → 2, 9 → 3, 3)

c) $\sqrt{3} + \sqrt{3} = 2\sqrt{3}$

d) $\sqrt{27} + \sqrt{12} = \sqrt{3\cdot3}3 + \sqrt{2\cdot2}3$

(27 → 3, 9 → 3, 3; 12 → 2, 6 → 2, 3)

$3\sqrt{3} + 2\sqrt{3} = \boxed{5\sqrt{3}}$

2-85) a) years = x
initial value = \$12,250
mult = 1 − .11 = .89
$y = 12{,}250(.89)^x$

b) months = x
initial value = 1000
mult = $1 + \frac{.06}{12} = 1 + .005 = 1.005$
$y = 1000(1.005)^x$

2-86) a) $16^{5/4} = \sqrt[4]{16^5} = 2^5 = \boxed{32}$

b) $(x^5y^4)^{1/2} = \sqrt{x^5y^4} = \boxed{x^2y^2\sqrt{x}}$

c) $(x^2y^{-1})(x^{-3}y)^0$

$\frac{x^2}{y} \cdot 1 = \boxed{\frac{x^2}{y}}$

2-87) 18 lbs | $4.89 | 5.43
$92.07 | Colum | Mocha

$C + M = 18$ $\quad M = 18 - C$

$4.89C + 5.43M = 92.07$

$4.89C + 5.43(18-C) = 92.07$

$4.89C + 97.74 - 5.43C = 92.07$

$-.54C + 97.74 = 92.07$

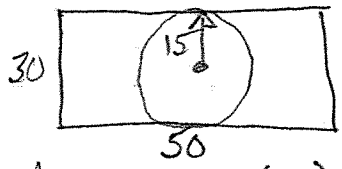
$-97.74 \quad -97.74$

$\frac{-.54C}{-.54} = \frac{-5.67}{-.54}$ $\quad C = 10.5$ lbs

$M = 18 - 10.5 = 7.5$ lbs

Columbian: 10.5 lbs
Mocha Java: 7.5 lbs

2.2.1 Cont'd, Thurs 11/13 (2-88 → 2-94)

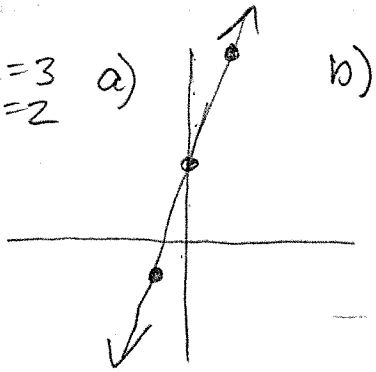
2-88) a) 

$r_{max} = 15$ ft

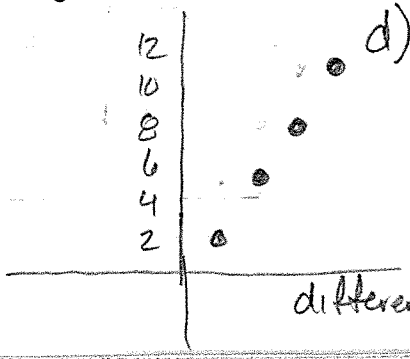
b) Area $= 30(50) - \pi(15)^2 = 1500 - 706.9 = 793.1$

Volume $= (793.1)\left(\frac{8}{12}\right) =$

thickness $= \frac{8''}{12''/ft}$ $= 528.7$ ~~ft³~~ $\cdot \frac{\$2.39}{\text{~~ft³~~}} =$ **$1263.70**

2-89) $m = 3$, $b = 2$ a) 

b) $y = 3x + 2$ c) (2, 5, 8, 11)



d) One is continuous and one is discrete. They have the same slope so the "lines" are parallel but different y-intercepts

2-90) a) $y = 1.465 \times 10^{12}(1.0317)^{29} = 4.116 \times 10^{12}$

b) $y = 1.665 \times 10^{12}(1.0317)^{t}$

c) Probably not. There could be an economic depression.

2-91) a) $\sqrt{x} + \sqrt{y} + 5\sqrt{x} + 2\sqrt{y} = \boxed{6\sqrt{x} + 3\sqrt{y}}$

b) $(2\sqrt{8})^2 = 4(8) = \boxed{32}$

c) $\frac{\sqrt{50}}{\sqrt{2}} = \sqrt{\frac{50}{2}} = \sqrt{25} = \boxed{5}$

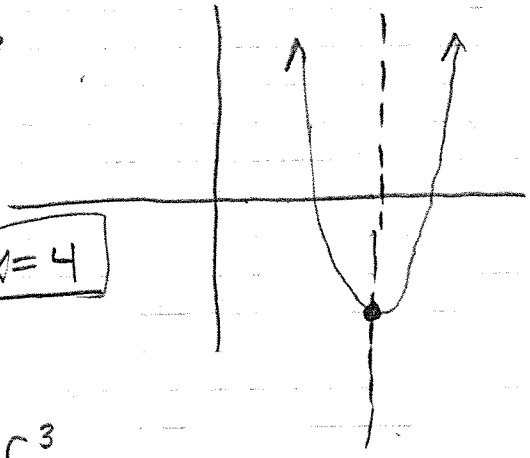
d) $\sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{\sqrt{4}} = \boxed{\frac{\sqrt{3}}{2}}$

2-92) a) $2x^2(3x + 4x^2y) = \boxed{6x^3 + 8x^4y}$

b) $(x^3y^2)^4(x^2y) = x^{12}y^8 \cdot x^2y = \boxed{x^{14}y^9}$

2-93) $y = 2(x-4)^2 - 3$

$V: (4, -3)$



line of symmetry: $\boxed{x = 4}$

2-94) a) $V = 4\pi r^2 + \frac{4}{3}\pi r^3$

$r = 1 \quad V = 4\pi + \frac{4}{3}\pi = \boxed{16.755\ m^3}$

b) $r = 2 \quad 4\pi(4) + \frac{4}{3}\pi(8) = 16\pi + \frac{32}{3}\pi = \frac{48}{3}\pi + \frac{32}{3}\pi$

$V = \frac{80\pi}{3} = \boxed{83.776\ m^3}$

No, because the r is squared for the cylinder and cubed for the hemispheres

c) $V = 4\pi r^2 + \frac{4}{3}\pi r^3$

Friday 11/4 2.2.2 (2-107 → 2-120)

2-107) a) $(2,3)$ $y = (x-2)^2 + 3$

b) $(2,3)$ $y = (x-2)^3 + 3$

c) $(-6,0)$ $y = -2(x+6)^2$

2-108) a) D: all real #s
R: $y \geq 3$

b) D: all real #s
R: all real #s

c) D: all real #s
R: $y \leq 0$

2-109) a) $y = ax^3$ (compresses or stretches)

b) $y = x^2 - a$ (shifts up or down)

c) $y = (x-a)^2 + 7$ (shifts left or right)

d) $y = \frac{1}{x} + a$ (shifts up or down)

2-110) a) $(3, 0.05)$ $(5, 0.0125)$ $y = ab^x$

$.05 = ab^3$ $\quad .0125 = ab^5$

$a = \frac{.05}{b^3}$ $\quad a = \frac{.0125}{b^5}$

$\frac{.05}{b^3} = \frac{.0125}{b^5}$

$\frac{.05b^5}{b^3} = \frac{.0125b^3}{b^3}$

$\frac{.05b^2}{.05} = \frac{.0125}{.05}$

$\sqrt{b^2} = \sqrt{.25}$

$b = .5$

$a = \frac{.05}{(.5)^3} = .4$

$y = .4(.5)^x$

2-110 b) $(1, 16)$ $(4, 128)$

$16 = ab^1$ $\quad 128 = ab^4$

$a = \frac{16}{b}$ $\quad a = \frac{128}{b^4}$ $\quad \frac{16}{b} = \frac{128}{b^4}$

$\frac{16b^4}{b} = \frac{128b}{b}$

$\frac{16b^3}{16} = \frac{128}{16}$ $\quad \sqrt[3]{b^3} = \sqrt[3]{8}$ $\quad b = 2$

$a = \frac{16}{2} = 8$ $\quad \boxed{y = 8(2)^x}$

2-111) a) $5^{-2} \cdot 4^{1/2} = \frac{2}{5^2} = \boxed{\frac{2}{25}}$

b) $\frac{3x^1 z^{-2}}{(xy)^{-1} z^2} = \frac{3xy^2 \cdot xy}{z^2 \cdot z^2} = \boxed{\frac{3x^2y^3}{z^4}}$

c) $(3m^2)^3 (2mn)^{-1} (8n^3)^{2/3}$

$27m^6 \cdot \frac{1}{2mn} \cdot 8^{2/3} \cdot n^2$

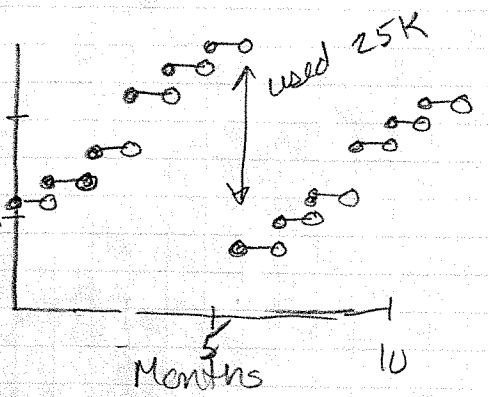
$\frac{27m^5}{2n} \cdot (2)^2 \cdot n^2 = \frac{(27)(2)m^5n^2}{n} = \boxed{54m^5n}$

d) $(5x^2y^3z)^{1/3} = 5^{1/3} x^{2/3} y^1 z^{1/3} = y\sqrt[3]{5x^2z}$

2-112) a)

K.C. 1500 each way
so 3000 Tot every month

Seattle 1900 TOT every 3 mon



Table

Month	Miles
1	15 000
2	18000
3	22900
4	25,900
5	28900
6	8900 — used 25000
7	11800
8	14800
9	19700
10	27700
11	25700
12	5600

b) highest is 28,900 miles after 5 months (May)

c) This year = 5600 miles

d) No, he will not be able to go in Dec., he

2-113) a) $\frac{y}{2} = \frac{2(x-17)^2}{2}$ $\sqrt{\frac{y}{2}} = \sqrt{(x-17)^2}$

$\pm\sqrt{\frac{y}{2}} = x-17$

$+17 \quad +17$

$\boxed{x = \pm\sqrt{\frac{y}{2}} + 17}$

b) $(y+7)^3 = (\sqrt[3]{x+5})^3$

$(y+7)^3 = x+5$

$-5 \quad -5$

$\boxed{x = (y+3)^3 - 5}$

2-114) a) $y = 5x-2$ $\quad$ $3x+18 = 5x-2$

$y = 3x+18$ $\quad$ $-3x \quad -3x$

$18 = 2x-2$

$+2 \quad +2$

$y = (5)(10)-2$ $\quad$ $\frac{20}{2} = \frac{2x}{2}$ $\quad$ $x = 10$

$y = 50-2 = 48$

$\boxed{(10, 48)}$

b) $y = x-4$ $\quad$ $2x+3(x-4) = 17$

$2x+3y = 17$ $\quad$ $2x+3x-12 = 17$

$5x-12 = 17$

$+12 \quad +12$

$y = \frac{29}{5} - 4$ $\quad$ $\frac{5x}{5} = \frac{29}{5}$

$x = 29/5$

$y = \frac{29}{5} - \frac{20}{5} = \frac{9}{5}$

$\boxed{\left(\frac{29}{5}, \frac{9}{5}\right)}$

2-115) a) $\sqrt{75} + \sqrt{27} = \sqrt{3\cdot 25} + \sqrt{3\cdot 9} = 5\sqrt{3} + 3\sqrt{3}$

$3 \quad 25 \quad 3 \quad 9$

$\boxed{= 8\sqrt{3}}$

b) $\sqrt{x} + 2\sqrt{x} = \boxed{3\sqrt{x}}$

c) $(\sqrt{12})^2 = 12$

d) $(3\sqrt{12})^2 = 9(12) = 108$