1. a. $\frac{x}{x+3} = \frac{8}{x+6}$

$x(x+6) = 8(x+3)$

$x^2+6x = 8x+24$

$x^2-2x-24$

$(x-6)(x+4)$

$x = 6, -4$ ✓ both work

b. $\frac{x^2}{x^2+2x+1} \div \frac{3x}{x^2-1} = \frac{x^2-x}{(x+1)(x+1)} \cdot \frac{(x-1)(x+1)}{3x} = \frac{x(x-1)}{3(x+1)}$

2. a. $5x^2-20x = -35$

$5x^2-20x+35$

$5(x^2-4x+7)$

$x^2-4x+7=0$

$x^2-4x+4 = -7+4$

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

$x-2 = \pm i\sqrt{3}$

$x = 2 \pm i\sqrt{3}$

b. discriminant $= b^2-4ac$

$d = (4)^2-(4\cdot 2\cdot -3) = 40$

2 real solutions

3. $y = 2x^2+8x-32$

$a=2$

vertex $(-2, -40)$ - found by graphing

$y = 2(x+2)^2-40$

4. $-2 \left| \begin{array}{cccc} 1 & -3 & 11 & K \\ \downarrow & -2 & 10 & -42 \\ \hline 1 & -5 & 21 & -5 \end{array} \right.$

$K-42 = -5$

$K = 37$

$3 \left| \begin{array}{cccc} 1 & -3 & 11 & 37 \\ \downarrow & 3 & 0 & 33 \\ \hline 1 & 0 & 11 & 70 \end{array} \right.$

5. a. $5x^3-135$

$5(x^3-27)$

$5(x-3)(x^2+3x+9)$

b. $2x^2+10x-48$

$2(x^2+5x-24)$

$2(x+8)(x-3)$

c. $3x^4-75x^2-432$

$3(x^4-25x^2-144)$

$3(x^2-16)(x^2-9)$

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

6. $f(x)=\frac{(x-2)(x+4)}{(x-2)(2x+1)}$

hole $(2, 6/9) = (2, 2/3)$

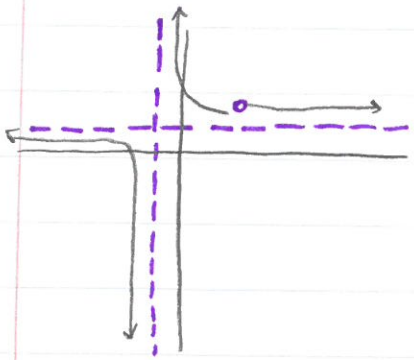
VA $2x+1=0$

$x=-1/2$

Domain $(-\infty, -1/2) \cup (-1/2, 2) \cup (2, \infty)$

HA $y=1/2$

Range $(-\infty, 1/2) \cup (1/2, 2/3) \cup (2/3, \infty)$



7 a $\sqrt{7x-6} - \sqrt{5x+2} = 0$

$\sqrt{7x-6} = \sqrt{5x+2}$

$7x-6 = 5x+2$

$2x = 8$

$x = 4$ ✓

b. $(x-2)^{2/3} - 4 = 5$

$(x-2)^{2/3} = 9$

$x-2 = -27$ $\quad x-2 = 27$

$x = -25$ $\quad x = 29$

8. $6x^4 + 22x^3 + 11x^2 - 38x - 40$

graph to find real zeros. $-2, 4/3, \frac{-3 \pm i}{2}$

-2	6	22	11	-38	-40
	↓	-12	-20	18	40
	6	10	-9	-20	0
$\frac{4}{3}$	↓	8	24	20	
	6	18	15	0	

$6x^2 + 18x + 15$ quad formula

$x = \frac{-18 \pm \sqrt{-36}}{12}$

$= \frac{-18 \pm 6i}{12} = \frac{-3 \pm i}{2}$

9. graph in calc.

2nd trace intersection enter, enter, enter

(0,1) (4,9)

10 a. $a_n = -1(n-1) + -2$

$a_{10} = -11$

$S_{10} = -65$

b. $a_n = 2(3)^{n-1}$

$a_{10} = 39366$

$S_{10} = 59048$

11 a. 1/2 - vertical compression

-1 right 1

+3 up 3

b. - reflection

2 vertical compression

+4 left 4

-6 down 6

12. Function domain $[2, \infty)$

Function range $[3, \infty)$

$y^{-1} = (x-3)^2 + 2$

Inverse domain $[3, \infty)$

Inverse range $[2, \infty)$

13 a. $\frac{3u+14}{5} = \frac{2u}{1}$

$3u + 14 = 10u$

$14 = 7u$

$u = 2$

b. $\frac{7x+5}{2x-5} = \frac{6}{1}$

$7x + 5 = 12x - 30$

$35 = 5x$

$x = 7$

c. $3b\log 7 = (b+2)\log 12$

$3b\log 7 = b\log 12 + 2\log 12$

$3b\log 7 - b\log 12 = 2\log 12$

$b(3\log 7 - \log 12) = 2\log 12$

$b = \frac{2\log 12}{3\log 7 - \log 12}$

14 area sector

$A_{\overset{\frown}{PQ}} \frac{135}{360} \pi 12^2 = 54\pi$

arc length

$L_{\overset{\frown}{PQ}} = \frac{135}{360} \pi \cdot 2 \cdot 12 = 9\pi$

b. $135° \times \frac{\pi}{180} = \frac{3\pi}{4}$

15. $\cos(135) = -\frac{\sqrt{2}}{2}$

$\tan(330) = \frac{-1/2}{\sqrt{3}/2} = \frac{-1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$

$\sin(\frac{7\pi}{4}) = \frac{-\sqrt{2}}{2}$

$\csc(210) = -2$

$\sec(\pi) = -1$

$\cot(5\pi/6) = -\sqrt{3}$

16. Special Right Δ's

$y = 5\sqrt{3}$

$x = 10\sqrt{3}$

17. Parallelogram - 2 sets of // lines (opp.)
2 sets of $\cong$ sides (opp.)
diagonals bisect each other
opp ∠'s $\cong$
consecutive ∠'s are supp.

Square - Rectangle, Rhombus, //-gram
4 ⊾ ∠'s and 4 $\cong$ sides

Rectangle - 4 ⊾ ∠'s
- //-gram
- diagonals are $\cong$

Rhombus - 4 $\cong$ sides
- //-gram
- diagonals are ⊥
- diagonals bisect the ∠'s

Trapezoid - 1 pair of // sides

18. $2x = 12y + 8$
$2x = 12(10) + 8$
$2x = 128$
$x = 64$

$12y + 8 + 5y + 2 = 180$
$17y + 10 = 180$
$17y = 170$
$y = 10$

19. $112 = 16x$

$x = 7$

$3x + 5y = 41$

$3(7) + 5y = 41$

$21 + 5y = 41$

$5y = 20$

$y = 4$

20. $\frac{6}{24} \times \frac{x}{12}$ $\quad \frac{72 = 24x}{24}$ $\quad x = 3$

$? + 3 = 12$

$? = 9$

21. a. $6 \cdot 6 = 4(x+4)$

$36 = 4x + 16$

$20 = 4x$

$x = 5$

b. $(4x+2)8 = 9(4x)$

$32x + 16 = 36x$

$16 = 4x$

$x = 4$

c. $8x(14x) = 7(16)$

$112x = 112$

$x = 1$

22. a. $(x+3)^2 + (y-2) = 100$

b. $\left(\frac{3+5}{2}, \frac{6+10}{2}\right) = (4, 8)$

$(x-4)^2 + (y-8)^2 = 5$

$(3-4)^2 + (6-8)^2 = r^2$

$(-1)^2 + (-2)^2 = r^2$

$1 + 4 = r^2$

$5 = r^2$

23. $y = 1(x+2)^2 + 4$

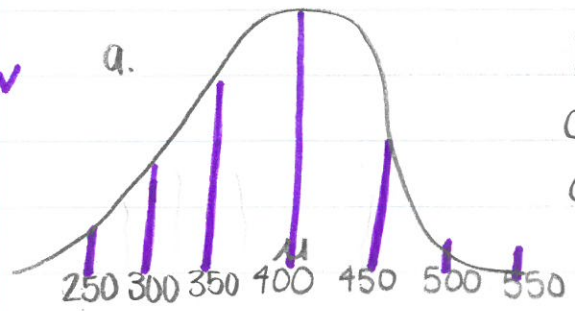
vertex = (-2, 4)

focus = (-2, 4 1/4)

directrix $y = 3\frac{3}{4}$

$c = \frac{1}{4a} = \frac{1}{4}$

24



b. 350-450

c. 550st above

d. 300st Below

e. 49.85%

f. 16%

g. 2.5%

h. 77.1%

i. 86.4%

j. 62.6%

k. 482.243

l. 451.822

m. 335.922

25. $moe = \frac{1}{\sqrt{n}} = \frac{1}{\sqrt{900}} = \pm .033 = \pm 3.3\%$

26.

X	700,000	0	-1,000,000
P(X)	.42	.22	.36

$E(X) = -66{,}000$

Juan makes two types of wood clocks to sell at local stores. It takes him 2 hours to assemble a pine clock, which requires 1 oz. of varnish. It takes 2 hours to assemble an oak clock, which requires 4 oz. of varnish. Juan has 16 oz. of varnish in stock and he can work 20 hours. If he makes $3 profit on each pine clock and $4 profit on each oak clock, how many of each type should he make to maximize his profits?

Let: x = pine y = oak Vertices: _____

	Pine	Oak	Total
Hours	2	2	20
Varnish	1	4	16
Profit	3	4	max

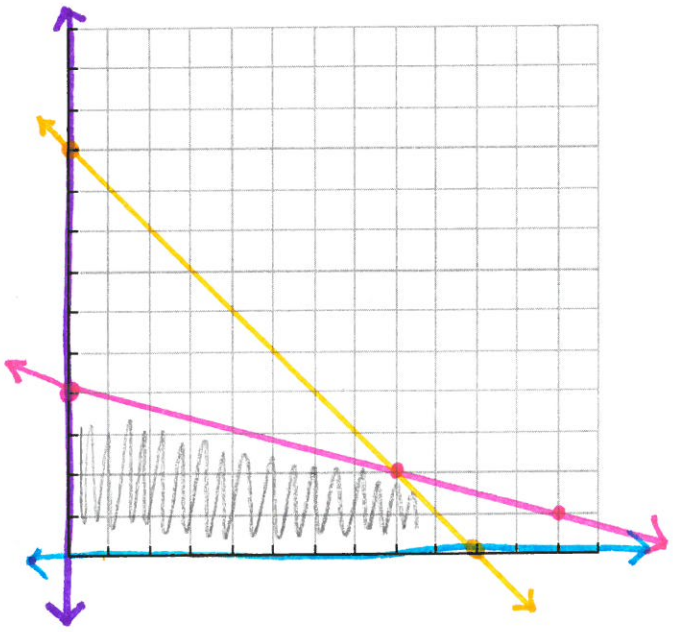
Constraints:

$2x + 2y \leq 20$ $x \geq 0$

$x + 4y \leq 16$ $y \geq 0$

Profit equation: $3x + 4y$

Points	Equation:	Profit
(0,0)	3(0)+4(0)	0
(0,4)	3(0)+4(4)	16
(10,0)	3(10)+4(0)	30
(8,2)	3(8)+4(2)	32



Solution

8 pine & 2 oak

Kay grows and sells tomatoes and green beans. It costs \$1 to grow a bushel of tomatoes, and it takes 1 yd^2 of land. It costs \$3 to grow a bushel of beans, and it takes 6 yd^2 of land. Kay's budget is \$15, and she has 24 yd^2 of land available. If she makes \$1 profit on each bushel of tomatoes and \$4 profit on each bushel of beans, how many bushels of each she grow to maximize profits?

Let: x = tomatoes y = beans Vertices: _____

	tomatoes	beans	Total
cost	1	3	15
land	1	6	24
price	1	4	max

Constraints:

$x + 3y \leq 15$

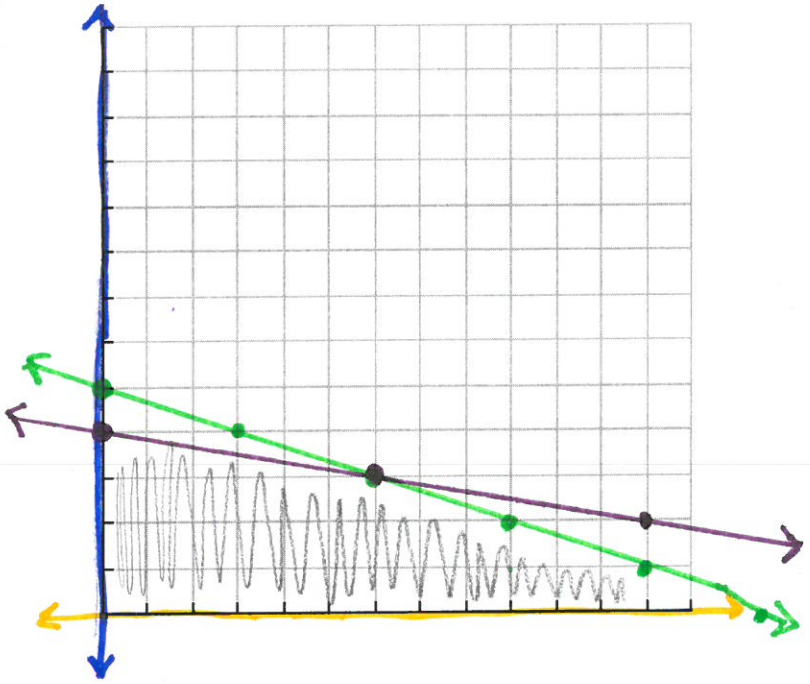
$x + 6y \leq 24$

$x \geq 0$

$y \leq 0$

Profit equation:

$x + 4y$



Points	Equation	Profit
(0,0)	1(0)+(0·4)	0
(0, 4)	1(0)+(4·4)	16
(6, 3)	1(6)+(3·4)	18
(15,0)	1(15)+0(4)	15

Solution:

6 tomatoes and 3 beans