

Tue/Wed 1/20 & 1/21 (4.2.4 4-99 → 4-105)

4-99) a) x-int $-5, -1$ vertex $\frac{-5 + -1}{2} = \frac{-6}{2} = -3$

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

$$\begin{pmatrix} -5, 0 \\ -1, 0 \end{pmatrix}$$

$$y \text{ for vertex} = -2$$

$$v(-3, -2)$$

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

$$0 = a(-5+3)^2 - 2$$

$$0 = a(-2)^2 - 2$$

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

$$a = \frac{1}{2}$$

$$\text{so } \boxed{y = \frac{1}{2}(x+3)^2 - 2}$$

b) $b = 5$ $m = \frac{5-0}{0-5} = \frac{5}{-5} = -1$ $\boxed{y = -x + 5}$

c) the x values @ the pt of intersection are -5 & 1

d) the ordered pair @ the pts of intersection are $(-5, 0)$ and $(1, 6)$

e) $-5 \leq x \leq 1$

f) if $y = 0$ when $x = -5$ and $x = -1$

g) if y is 4 then x is -1 on the graph

h) The parabola could be shifted up

4-100) $y \leq 3x + 3$

$$y \leq -3/4x + 3$$

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

$$4-101) a) \frac{2|3x-5|}{2} \geq \frac{4}{2}$$

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

$$3x-5 \geq 2 \quad \text{OR} \quad 3x-5 \leq -2$$

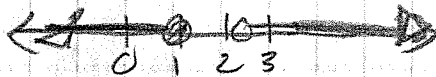
$$3x-5 \leq -2$$

$$\frac{3x}{3} \geq \frac{7}{3}$$

$$x \geq \frac{7}{3}$$

$$\frac{3x}{3} \leq \frac{3}{3}$$

$$x \leq 1$$



$$b) \frac{1}{3}(3x-6)^3 + 4 < 13$$

$$\left(\frac{1}{3}(3x-6)^3 < 9\right) \cdot 3$$

$$\sqrt[3]{(3x-6)^3} < \sqrt[3]{27}$$

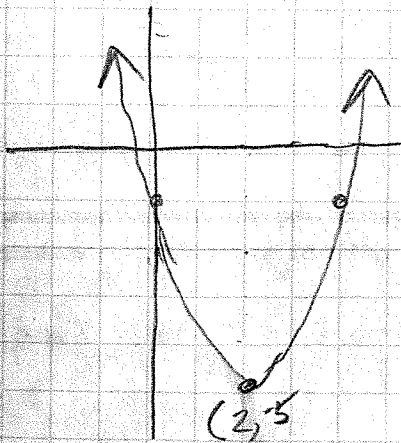
$$3x-6 < 3$$

$$\frac{3x}{3} < \frac{9}{3}$$

$$x < 3$$

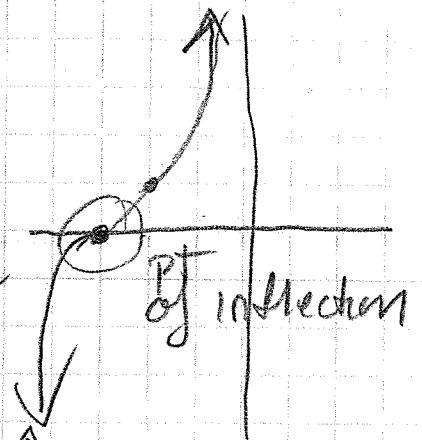


$$4-102) a) y = (x-2)^2 - 5$$



$$b) y \leq (x+3)^3$$

x	y
-2	1
-1	8
0	27
1	64
2	125
3	0

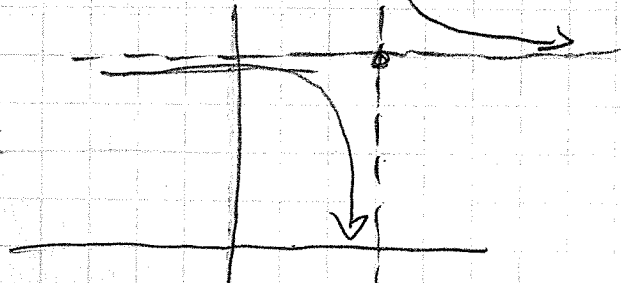


$$c) y = 4 + \frac{1}{x-3}$$

asymptotes

$$y = 4$$

$$x = 3$$



4-103)

$$\begin{array}{r} 4x - 3y = 65 \\ 2x + 3y = 3x - y \\ -3x \qquad -3x \end{array}$$

(alt int)

(vert angles)

$$-x + 3y = y$$

$$-x = -2y$$

$$x = 2y$$

$$4(4y) - 3y = 65$$

$$16y - 3y = 65$$

$$\frac{13y}{13} = \frac{65}{13}$$

$$y = 5$$

$$x = 4(5) = 20$$

$$m\angle CPM + 4x - 3y + 2x + 3y = 180$$

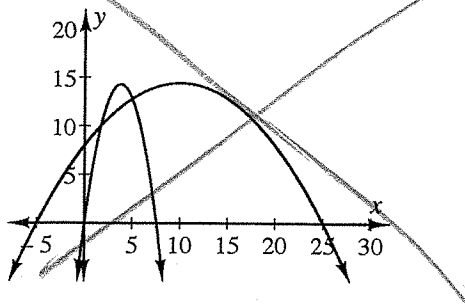
$$m\angle PM + 6x = 180$$

$$m\angle CPM = 180 - 6x = 180 - 6(20) = \boxed{60^\circ}$$

4.1.1-4.1.3 REVIEW

Answers

- | | | |
|---|---|----------------|
| 1. (4, 7) | 2. (-2, 5) | 3. no solution |
| 4. $(-\frac{1}{2}, 11)$ | 5. All real numbers | 6. (12, 3) |
| 7. $x = 4$. The horizontal line $y = 3$ crosses the parabola in only one point, at the vertex. | 8. $x = 2, x = 6$ | |
| 9. No solution. The horizontal line $y = 1$ does not cross the parabola. | 10. $x = 0, x = 8$. Add three to both sides to rewrite the equation as $\frac{1}{2}(x - 4)^2 + 3 = 11$. The horizontal line $y = 11$ crosses at these two points. | |
| 11. $x = 7, x = 1$ | 12. no solution | |
| 13. $x = 2$ | 14. No solution. (A square root must have a positive result.) | |
| 15. All real numbers. When graphed, these equations give the same line. | 16. (0, 4). The parabola and the line intersect only once. | |
| 17. No solution. This parabola and this line do not intersect. | 18. (2, -2) and (5, -5). The line and the parabola intersect twice. | |
| 19. 145 adult tickets were sold, while 290 child tickets were sold. | 20. There are 35 three-point questions and 15 six-point questions on the test. | |
21. By graphing we see that the nemesis' balloon when launched at the base of the wall (the y -axis), hits the path of the Dudley's water balloon. Therefore, if timed correctly, the nemesis is successful.

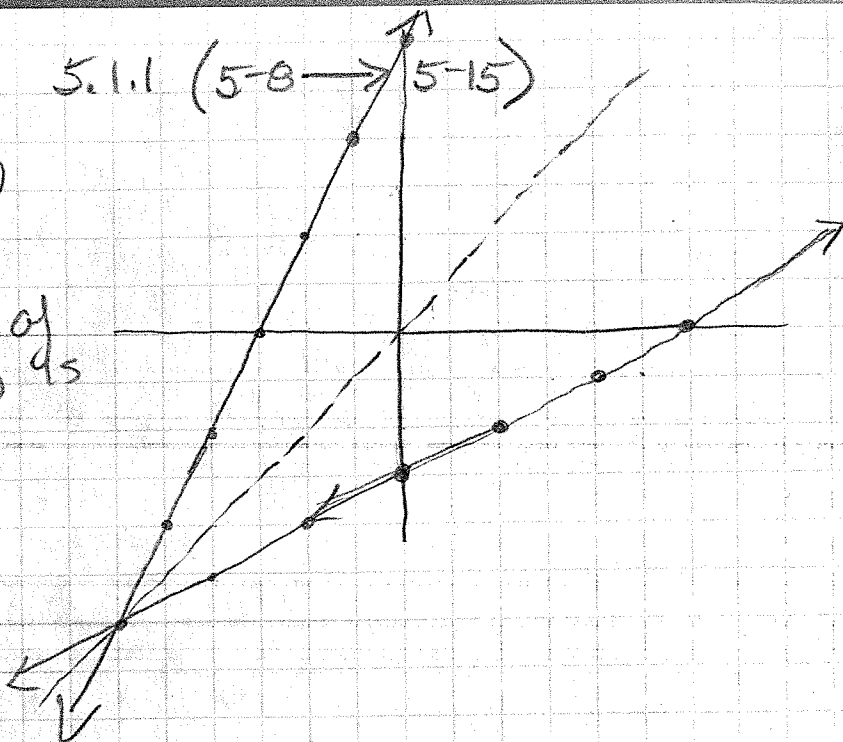


Monday 1/26 5.1.1 (5-8 → 5-15)

5-8) a) $y = 2(x+3)$
 $y = 2x + 6$

b) yes; line of symmetry is

$y = x$



5-9) a) $A(x) = 3^x$
 $A(2) = 3^2 = 9$

b) $B = 3^x$
 $3^4 = 3^y$
 $x = 4$

c) $B = 3^x$

$3^2 = 9$
 $3^{1.9} = 8.06$
 $3^{1.8} = 7.22$

$3^{1.85} = 7.6$
 $3^{1.89} = 7.98$

$x \approx 1.89$

5-10) $x = \sin^{-1} 0.75$
 $x = 48.6^\circ$

use the inverse sine to find the measure of the angle

✓ check: $\sin 48.6 = .75$

5-11) $10^x = 10^y$

$x = y$

Same bases so exponents are equal

5-12) a) $\frac{x}{3} = \frac{4}{5}$

$\frac{5x}{5} = \frac{12}{5}$ $x = \frac{12}{5}$

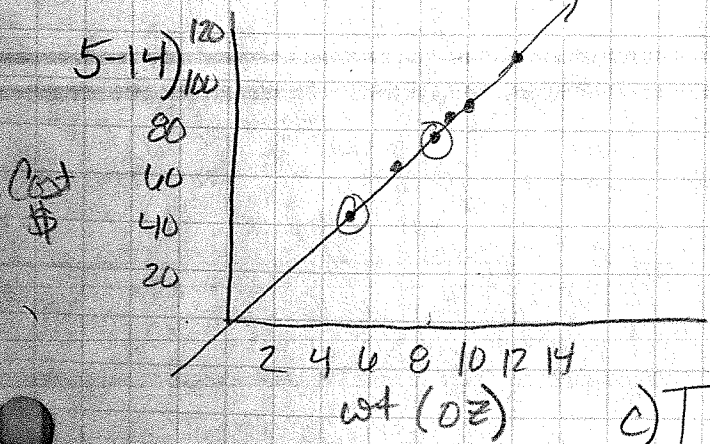
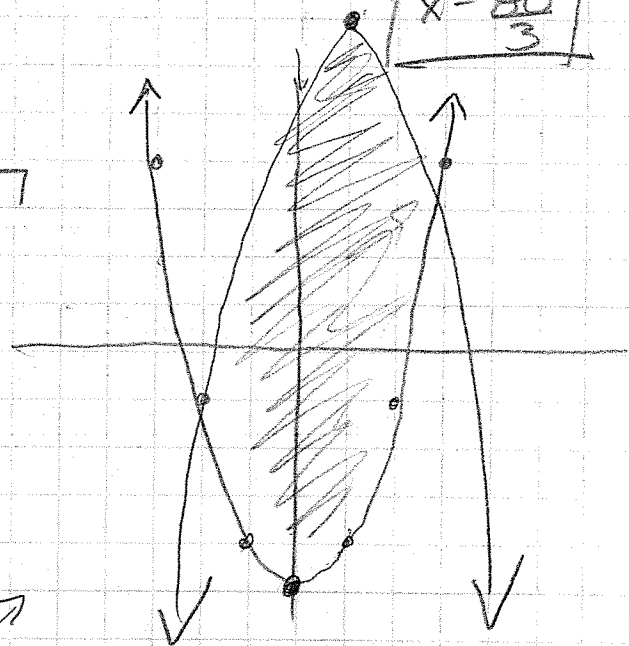
b) $\frac{x}{x+1} = \frac{5}{7}$

$7x = 5x + 5$
 $\frac{2x}{2} = \frac{5}{2}$ $x = \frac{5}{2}$

c) $\left(\frac{6}{15} = 2 - \frac{x}{5}\right) \cdot \frac{15}{1}$
 $6 = 30 - 3x$
 $-30 \quad -30$
 $-24 = -3x$
 $\frac{-24}{-3} = \frac{-3x}{-3}$
 $8 = x$

d) $\left(\frac{2}{3} + \frac{x}{5} = 6\right) \cdot \frac{15}{1}$
 $5(2) + 3(x) = 6(15)$
 $10 + 3x = 90$
 $-10 \quad -10$
 $3x = 80$
 $\frac{3x}{3} = \frac{80}{3}$
 $x = \frac{80}{3}$

5-13) $y \geq x^2 - 5$
 $y \leq -(x-1)^2 + 7$



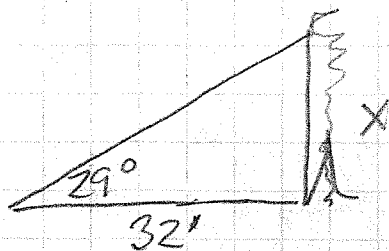
$m = \frac{78.5 - 44}{8.5 - 5} = \frac{34.5}{3.5} = 9.9$

$44 = 5(9.9) + b$
 $-5.5 = b$

c) $y = 9.9x - 5.5$

d) $y = 9.9(50) - 5.5 = \$489.50$

5-15)



$$\cancel{\tan 29 = \frac{x}{32}}$$

$$32 \tan 29 = x$$

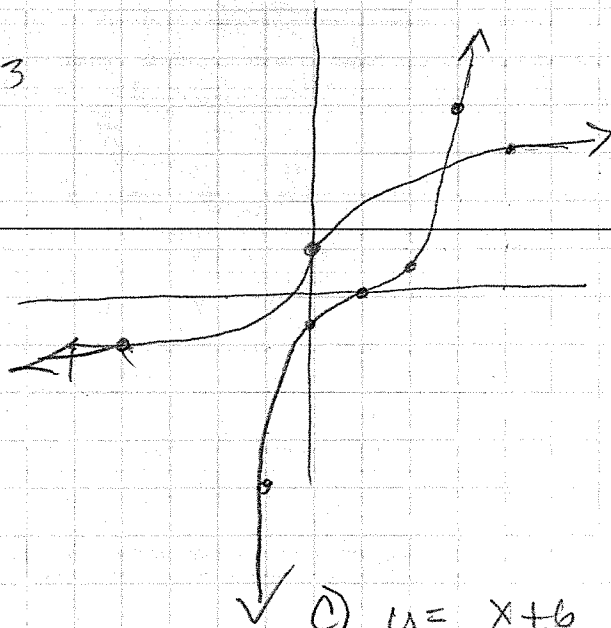
$$\boxed{17.74' = x}$$

Tues/Wed 1/26 & 1/27 (5.1.2 5-26 → 5-39)

5-26) $f(x) = \frac{1}{2}(x-1)^3$

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

x	y
0	1
4	3
-4	-1



5-27) a) $y = 3x - 8$

$$\boxed{y = \frac{x+8}{3}}$$

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

$$\boxed{y = 2(x-6)}$$

✓ c) $y = \frac{x+6}{2}$

$$\boxed{y = 2x - 6}$$

5-28) $3 = 8^x$

$$\boxed{x \approx .53}$$

$$8^{\frac{1}{2}} = 2.82$$

$$8^{.6} = 3.48$$

$$8^{.55} = 3.13$$

$$8^{.54} = 3.07$$

$$8^{.53} = 3.01$$

$$5-29) a) (x+2)(x-7)$$

$$\begin{array}{r} x^2 - 7x + 2x - 14 \\ \hline x^2 - 5x - 14 \end{array}$$

$$b) (3m+7)(2m-1)$$

$$\begin{array}{r} 6m^2 - 3m + 14m - 7 \\ \hline 6m^2 + 11m - 7 \end{array}$$

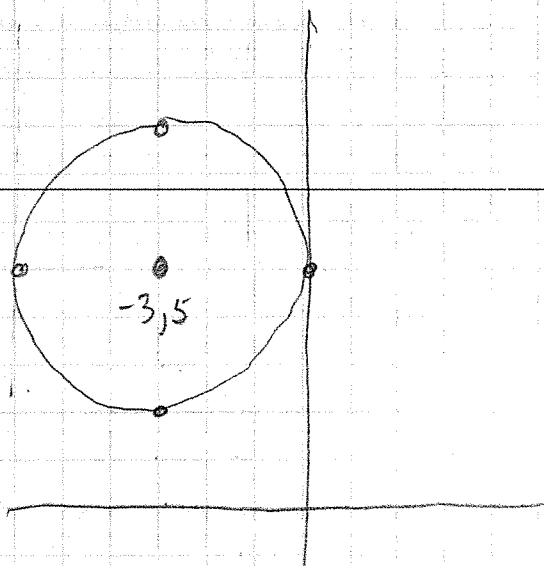
$$c) \begin{array}{r} (x-3)^2 \\ (x-3)(x-3) \\ \hline x^2 - 3x - 3x + 9 \\ \hline x^2 - 6x + 9 \end{array}$$

$$d) \begin{array}{r} (2y+3)(2y-3) \\ \hline 4y^2 - 6y + 6y - 9 \\ \hline 4y^2 - 9 \end{array}$$

$$5-30) c(-3, 5)$$

$$r=3$$

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



$$5-31) a) \frac{(x+2)(x-3)}{(x+1)(x-4)} \cdot \frac{(x+1)}{x(x+2)} = \boxed{\frac{x-3}{x(x-4)}}$$

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

$$c) \frac{2x}{x+4} + \frac{8}{x+4} = \frac{2x+8}{x+4} = \frac{2(x+4)}{(x+4)} = \boxed{2}$$

$$d) \frac{x}{x+1} - \frac{1}{x+1} = \boxed{\frac{x-1}{x+1}}$$

5-32) a) $f(x) = 1.5(m)^x$

$f(x) = 1.5(1.048)^x$

$25.25 = 1.5(m)^{60}$
 $16.8 = m^{60}$

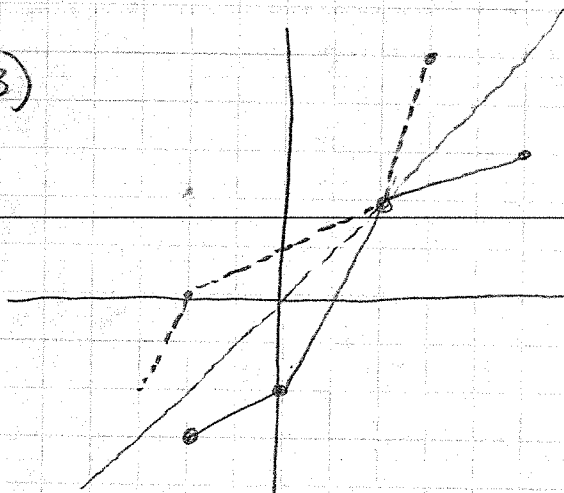
$m = \sqrt[60]{16.8}$

$m = 1.048$

b) $f(x) = 1.5(1.048)^{120}$

$\boxed{\$ 416.34}$

5-33)



$f(x)$ D: $-2 \leq x \leq 5$
R: $-3 \leq y \leq 3$

$f^{-1}(x)$ D: $-3 \leq x \leq 3$
R: $-2 \leq y \leq 5$

5-34) a) $L(x) = x^2 - 1$ $R(x) = 3(x+2)$

b) $L(3) = (3)^2 - 1 = 9 - 1 = 8$

$R(8) = 3(8+2) = 3(10) = \boxed{30}$

c) $R(3) = 3(3+2) = 15$

$L(15) = (15)^2 - 1 = 225 - 1 = 224$

Yes it changes; order does matter

5-35) $x - 2y = 7$
 $4y - 3x = 33$

$x = 2y + 7$

$4y - 3(2y + 7) = 33$

$4y - 6y - 21 = 33$

$-2y - 21 = 33$

No solution

The lines must be parallel