First Chapter Name _____

Linear Forms / Linear Inequalities / Linear Piece wise Functions

Slope-Intercept Form (e.g. $y = \frac{2}{3}x + 5$, or $y = 7x - 5$)

1. $3x - 2y = 8$

$-2y = -3x + 8$

$y = \frac{3}{2}x - 4$

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2. $5x + 3y = 22$

$3y = -5x + 22$

$y = \frac{-5}{3}x + 7\frac{1}{3}$

2. $y = \frac{-5}{3}x + 7\frac{1}{3}$

3. $7x - 3y = -11$

$-3y = -7x - 11$

$y = \frac{7}{3}x + 3\frac{2}{3}$

3. $y = \frac{7}{3}x + 3\frac{2}{3}$

Standard Form Equation

Put each equation in the $Ax + By = C$

4. $y = \frac{2}{5}x - 3$

$2x - 5y = 15$

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5. $y = -\frac{1}{2}x - 7$

$x + 2y = -14$

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6. $y = \frac{5}{2}x + 3$

$5x - 2y = -6$

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Write the equation in the indicated form.

9. $(3,-2)$, $(5,-5)$

$m = \frac{-3}{2}$

$3x + 2y = C$

$3(3) + 2(-2) = C$

$9 - 4 = C$

$5 = C$

$3x + 2y = 5$

Slope Int $y = \frac{-3}{2}x + 2\frac{1}{2}$

10. $(-2,3)$, $(-5,7)$

$m = \frac{-4}{3}$

$4x + 3y = C$

$4(-2) + 3(3) = C$

$-8 + 9 = C$

$1 = C$

Standard $4x + 3y = 1$

Write the slope, y intercept as an ordered pair, and x intercept as an ordered pair

11. $4x + 3y = -12$ m = $-4/3$ y - int = $(0,-4)$ x - int = $(-3,0)$

12. $y = \frac{2}{7}x + 5$ m = $2/7$ y - int = $(0,5)$ x - int = $(-17\frac{1}{2}, 0)$

$2x - 7y = -35$

Write the following equations.

13. Parallel to $y = \frac{2}{5}x - 4\frac{1}{9}$ through (2 , –3) in standard form.

$m = \frac{2}{5}$ $m_{\parallel} = \frac{2}{5}$, $(2,-3)$

$2x - 5y = C$

$2(2) - 5(-3) = C$

$4 + 15 = C$

$19 = C$

13. $2x - 5y = 19$

14. Perpendicular to $3x + 4y = -30$ through (6 , –1) in slope intercept form.

$m = -\frac{3}{4}$ $m_{\perp} = \frac{4}{3}$, $(6,-1)$

$y = \frac{4}{3}x + b$

$-1 = \frac{4}{3}(6) + b$

$-1 = 8 + b$

$-9 = b$

14. $y = \frac{4}{3}x - 9$

15. Parallel to $3x - 7y = 145$ through (–7 , 2) in slope intercept form.

$m = \frac{3}{7}$ $m_{\parallel} = \frac{3}{7}$, $(-7,2)$

$y = \frac{3}{7}x + b$

$2 = \frac{3}{7}(-7) + b$

$2 = -3 + b$

$5 = b$

15. $y = \frac{3}{7}x + 5$

Function Notation

$f(x) = 3x^2 - 2x + 9$ $\quad g(x) = 3x - 2$ $\quad p(x) = 2x + 8$ $\quad h(x) = x^2 + 2x + 7$

16. Solve $3[g(w+2)] - p(w) = \frac{3}{4}[p(2w)]$

$3[3(w+2)-2] - [2w+8] = \frac{3}{4}[2(2w)+8]$

$3[3w+6-2] - [2w+8] = \frac{3}{4}[4w+8]$

$3[3w+4] - [2w+8] = 3w+6$

$9w+12-2w-8 = 3w+6$

$7w+4 = 3w+6$

$7w-3w = 6-4$

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

$w = 1/2$

17. Solve to four decimal places $\quad f(g(t)) = h(g(t-3))$

$f(3t-2) = h(3[t-3]-2)$

$f(3t-2) = h(3t-11)$

$3[3t-2]^2 - 2[3t-2] + 9 = [3t-11]^2 + 2[3t-11] + 7$

$3[9t^2-12t+4] - 2[3t-2] + 9 = 9t^2 - 66t + 121 + 6t - 22 + 7$

$27t^2 - 36t + 12 - 6t + 4 + 9 = 9t^2 - 60t + 106$

$27t^2 - 42t + 25 = 9t^2 - 60t + 106$

$18t^2 + 18t - 81 = 0$

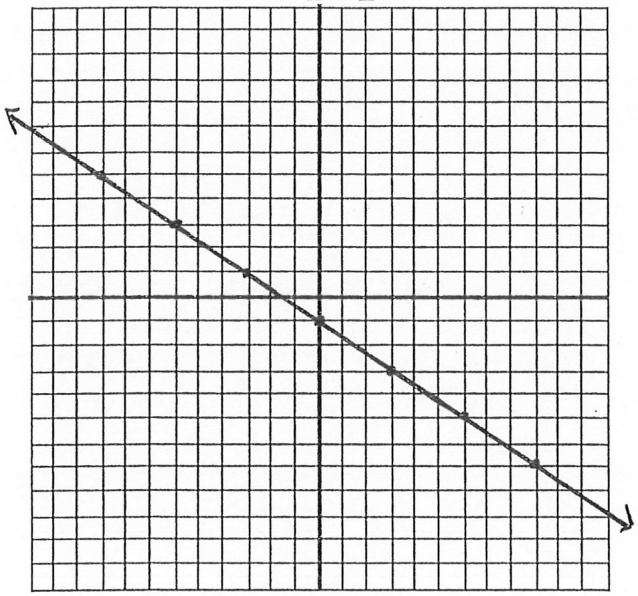
QUADRATIC FORMULA PRODUCES

$t = \{-2.6794, 1.6794\}$

Graph Each of the following

18. $y = -\frac{2}{3}x - 1$ m = $-2/3$ *steep_or_shallow* SHALLOW / *incline_or_decline* DECLINE y - int = (0, -1)

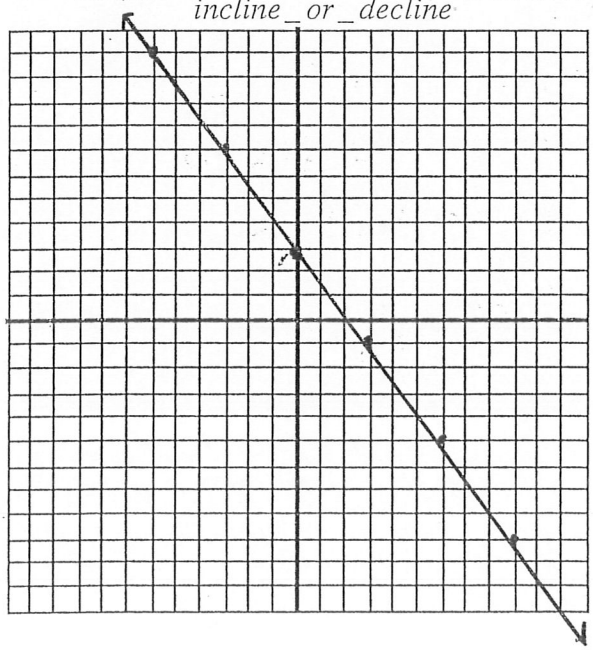
x	y
-6	3
-3	1
0	-1
3	-3
6	-5



19. $4x + 3y = 9$ m = $-4/3$ *steep_or_shallow* STEEP / *incline_or_decline* DECLINE y - int = (0, 3)

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

x	y
-6	11
-3	7
0	3
3	-1
6	-5

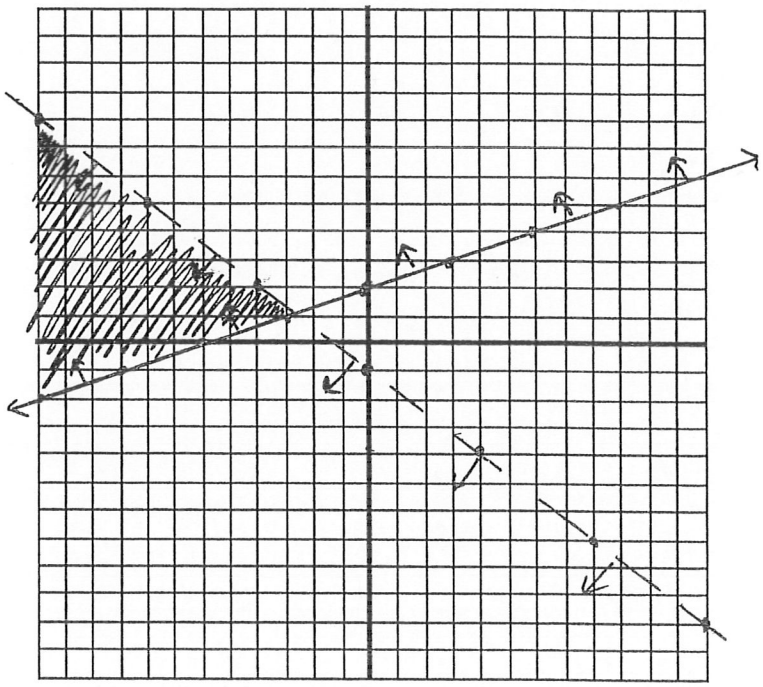


Graph The System of Inequalities (**Only shade the region that solves the system**)

20.

$$y \geq \frac{1}{3}x + 2$$

$$y < \frac{-3}{4}x - 1$$

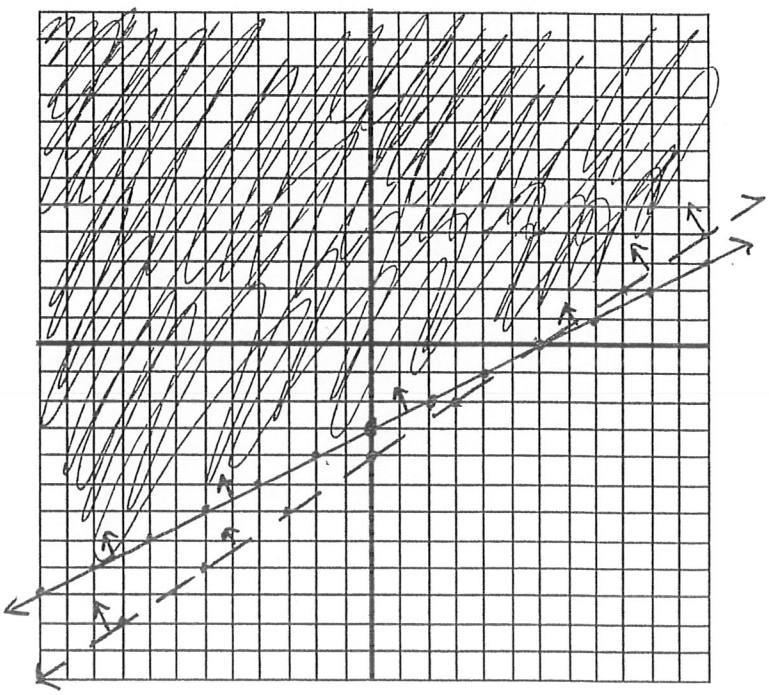


21.

$$y \geq \frac{1}{2}x - 3$$

$$2x - 3y < 12$$

$y = \frac{2}{3}x - 4$



TAKE HOME PORTION

Graph The System of Inequalities **(Only shade the region that solves the system)**

22.

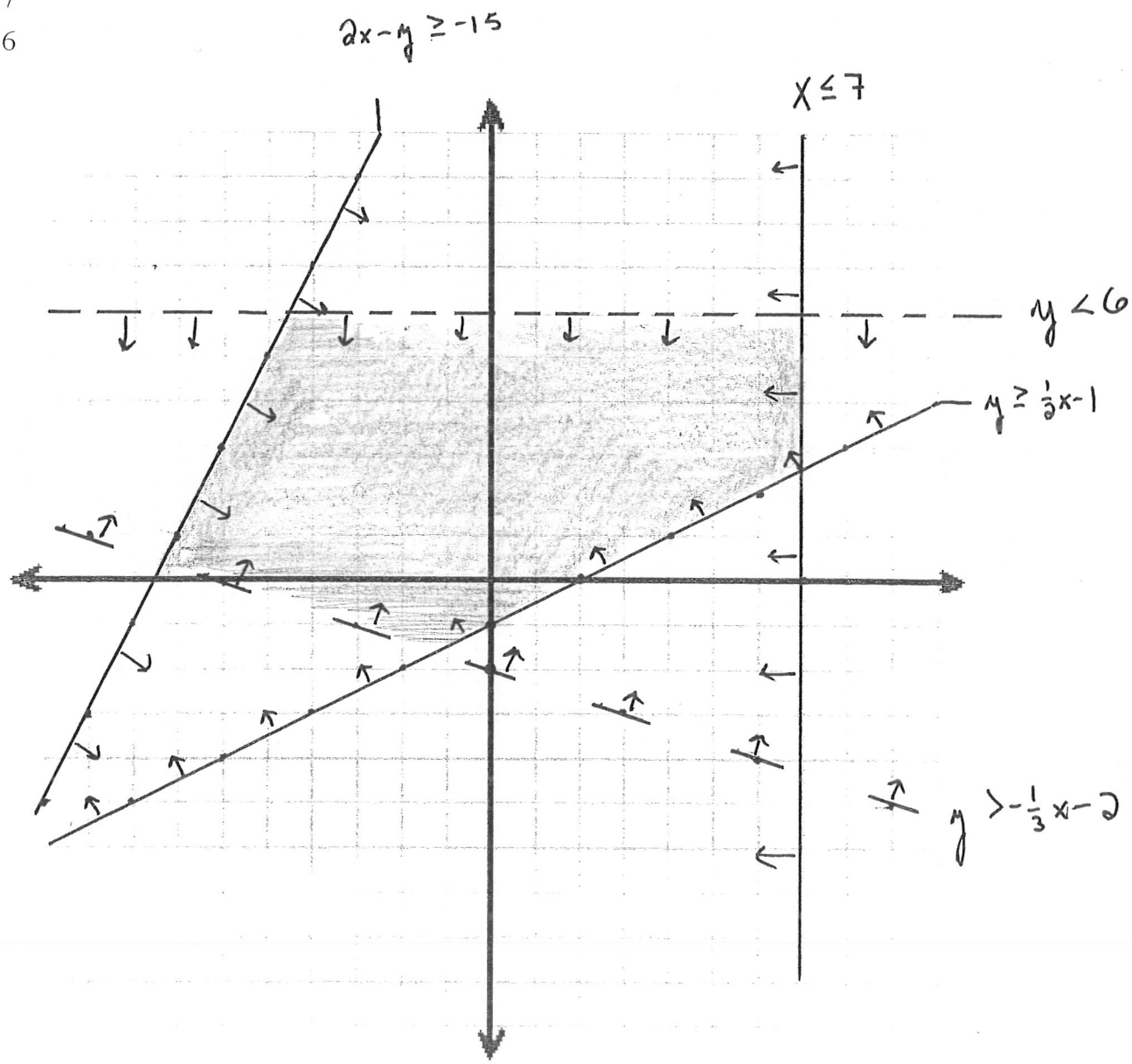
$y \geq \frac{1}{2}x - 1$

$y > -\frac{1}{3}x - 2$

$2x - y \geq -15$ → $m = \frac{2}{1}$ $(-7, 1)$

$x \leq 7$

$y < 6$



23. $h(x) = \begin{cases} \lfloor x \rfloor + 2 \_ for \ldots (-\infty < x < -7) \\ -\frac{1}{2}x - 5\frac{1}{2}, \ldots -7 \le x \le -3 \\ x + 4, \_ for \ldots (-3, 0] \\ |2x - 4|, \ldots 0 < x \le 3 \\ 4, \_ for \ldots (3, 5] \\ -2\lceil x \rceil + 14 \ldots 5 < x \le \infty \end{cases}$

→ FLOOR - "CLOSED CIRLE TO LEFT"

X	Y
-9.3	-8
-8.3	-7
-7.3	-6

→ LINEAR FUNCTION
m = -1/2 (-7, -2) } CLOSED ENDPOINTS
Slope NICE POINT

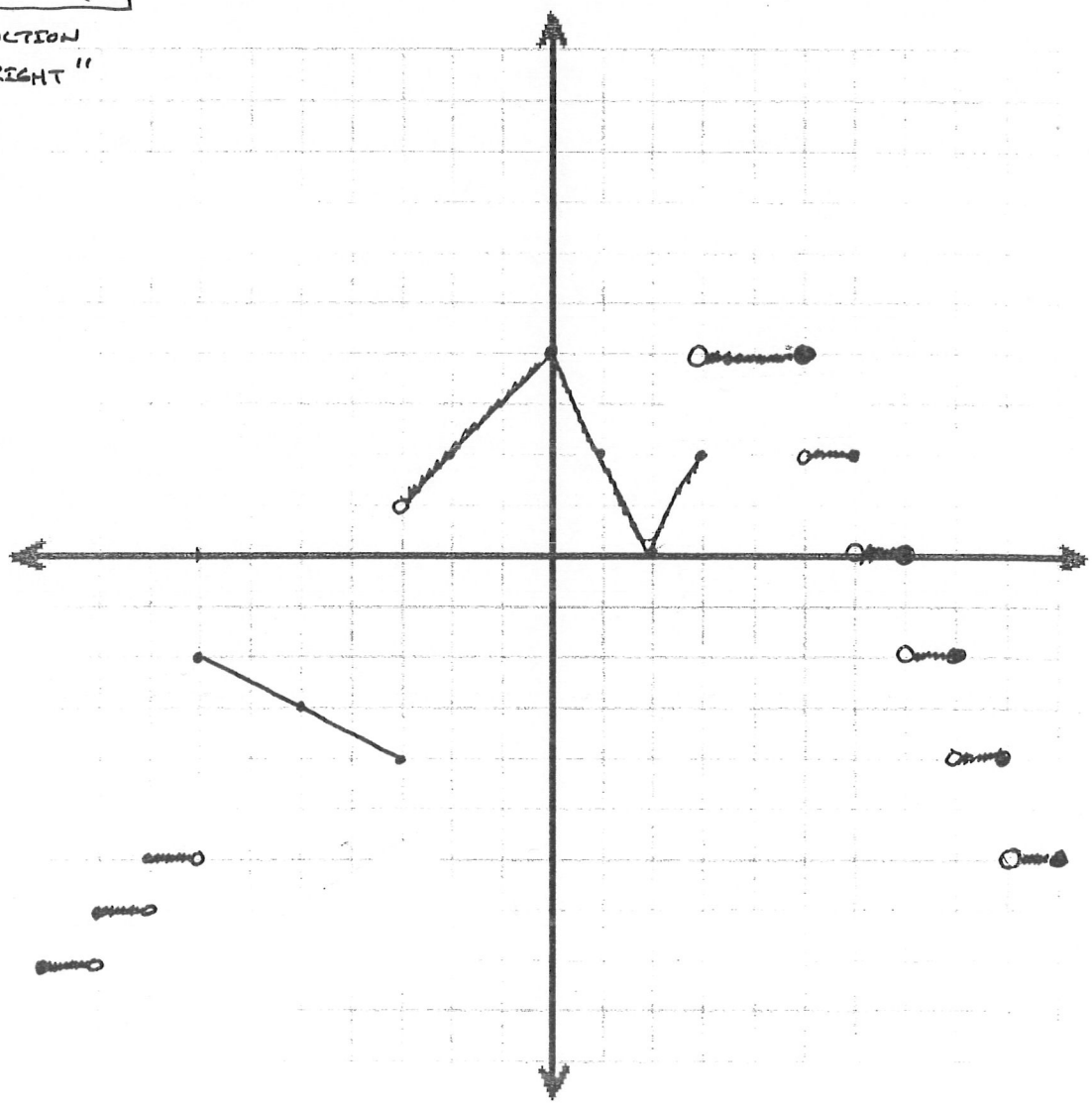
→ LINEAR FUNCTION
m = 1/1 (-2, 2) } OPEN TO LEFT CLOSED ON RIGHT

→ ABSOLUTE VALUE } OPEN TO LEFT CLOSED ON RIGHT

X	Y
0	4
1	2
2	0
3	2

CEILING FUNCTION
"CLOSED TO RIGHT"

X	Y
5.5	2
6.5	0
7.5	-2
8.5	-4
9.5	-6



Graph each system independently (create the four regions for solutions)

24.

$$\left.\begin{array}{l} b(x) < -|x+8|+6 \\ c(x) \geq 2x+16 \end{array}\right\} \text{for} \ldots (-\infty,-6)$$

x	y
-10	4
-9	5
-8	6
-7	5
-6	4 ← OPEN CIRCLE

$c(x)$: $m = \frac{2}{1}$ SLOPE

$(-10,-4)$ NICE POINT!

$m = -\frac{1}{2}$ SLOPE

$(-4,8)$ NICE POINT

$$\left.\begin{array}{l} f(x) < -\frac{1}{2}x+6 \\ g(x) \geq \lfloor x+5 \rfloor^2 + 2 \end{array}\right\} \text{for} \ldots [-6,-2)$$

"FLOOR"

x	y
-5.5	3
-4.5	2
-3.5	3
-2.5	6

$$\left.\begin{array}{l} h(x) < 6 \\ k(x) > \left|\frac{1}{2}x-1\right|+1 \end{array}\right\} \text{for} \ldots [-2,4]$$

---- HORIZONTAL LINE

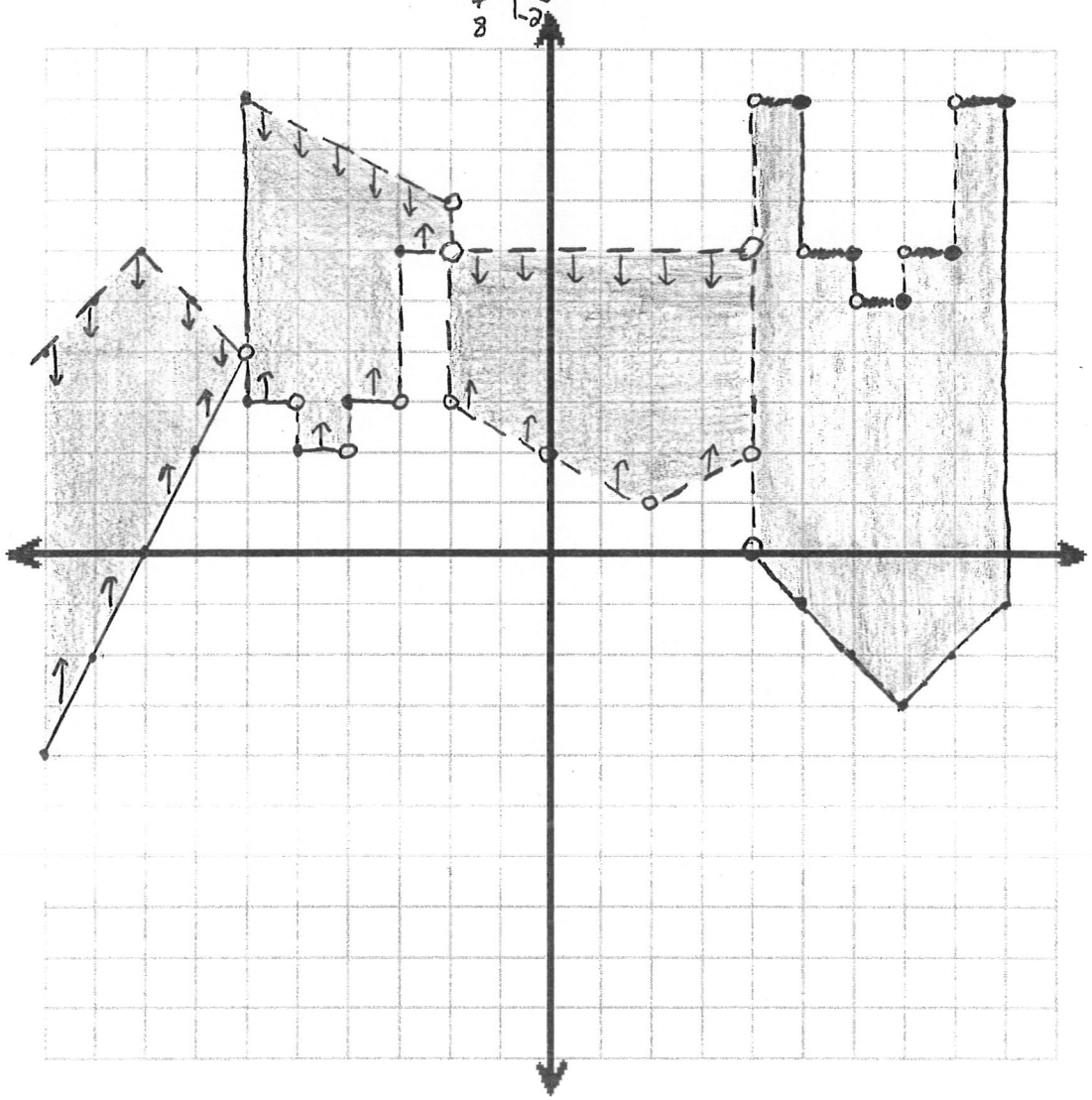
x	y
-2	3
0	2
2	1
4	2

$$\left.\begin{array}{l} m(x) \geq |x-7|-3 \\ p(x) \leq \lceil x-7 \rceil^2 + 5 \end{array}\right\} \text{for} \ldots (4,9]$$

x	y
4	0
5	-1
6	-2
7	-3
8	-2

"CEILING"

x	y
4.5	9
5.5	6
6.5	5
7.5	6
8.5	9



$f(x) = 5x^2 - 2x + 7 \quad g(x) = 3x - 2 \quad p(x) = 4x + 13 \quad h(x) = x^2 + 3x + 5$

25. Solve to four decimal places $h\left(p\left(\frac{3}{4}z - 2\right)\right) = 5[f(z)] - 7[g(z)] - 6$

L.H.S.

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

$= 4\left[\frac{3}{4}z - 2\right] + 13$

$= 3z - 8 + 13$

$= 3z + 5$

$h(3z + 5)$

$= [3z+5]^2 + 3[3z+5] + 5$

$= 9z^2 + 30z + 25 + 9z + 15 + 5$

$= 9z^2 + 39z + 45$

R.H.S.

$5[5z^2 - 2z + 7] - 7[3z - 2] - 6$

$= 25z^2 - 10z + 35 - 21z + 14 - 6$

$= 25z^2 - 31z + 43$

So $9z^2 + 39z + 45 = 25z^2 - 31z + 43$

$\rightarrow \quad \rightarrow \quad \rightarrow \quad -9z^2 - 39z - 45$

$0 = 16z^2 - 70z - 2$

* USE QUADRATIC FORMULA PROGRAM

$z = \{-.0284, 4.4034$