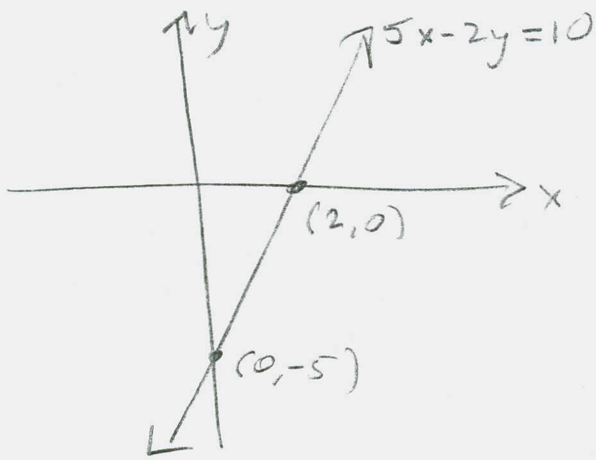
MAT 099 105 + 5B = 110! Test 2

Spring, 2010 Name KEY

1. (5 pts) Graph the linear equation $5x - 2y = 10$. Show x- and y-intercepts.

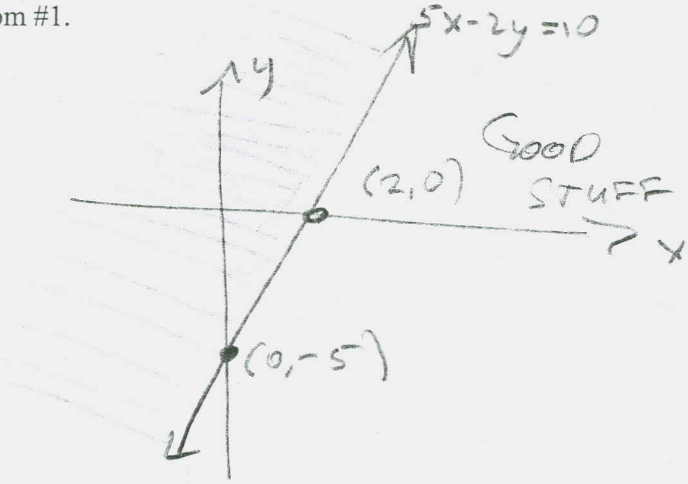
x	y
0	-5
2	0



45
60

2. (5 pts) Graph the linear inequality $5x - 2y \ge 10$. Be sure and show the "good stuff" clearly.
Hint: Use your work from #1.

$0 \ge 10$?
NO.
(0,0) BAD



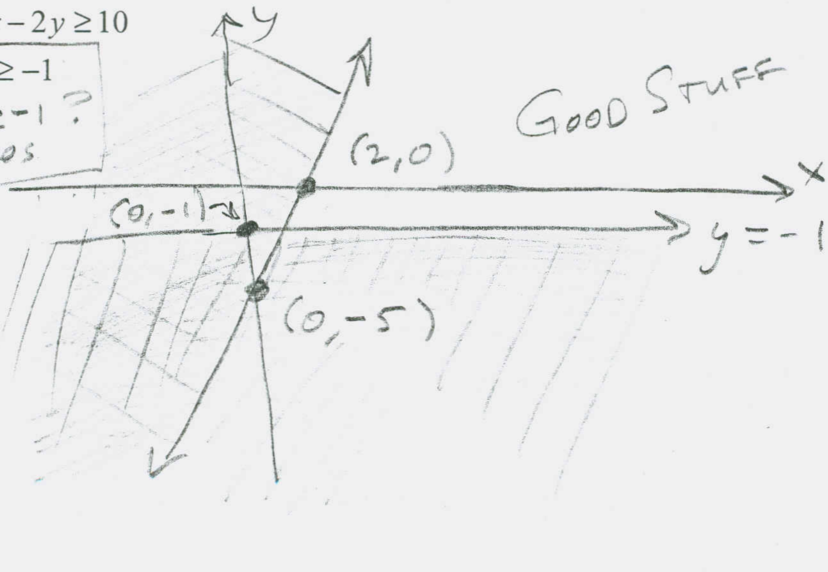
3. (5 pts) Graph the *intersection* of the following inequalities on the same set of coordinate axes. In other words, assume this is an AND situation, as in class. Hint: Use your work from #3. → #2

$5x - 2y \ge 10$

$y \ge -1$

$0 \ge -1$?
yes

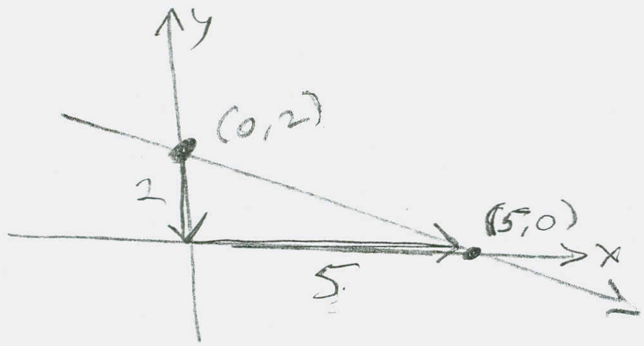
(0,0)
Good



.5

4. (5 pts) Use the slope and y-intercept to graph $f(x) = -\frac{2}{5}x + 2$. (I don't need to see an x-intercept.)

$(0,2)$, $m = -\frac{2}{5} = \frac{\text{Down } 2}{\text{RIGHT } 5}$



5. (5 pts) Determine if the following relation is a function. If not, explain why not. In either case, determine its domain and range.

$$\{(1,-2),(-2,1),(3,6),(-2,2),(-1,-2)\}$$

No. $x=-2$ corresponds to $y=1$ and $y=2$.

$D = \{1,-2,3,-1\}$, $R = \{-2,1,6,2\}$

6. (5 pts) Write the equation $5x - 2y = 10$ in function notation.

$-2y = -5x + 10$

$y = \frac{-5x+10}{-2}$

$y = -\frac{5}{-2}x + \frac{10}{-2}$

$y = \frac{5}{2}x - 5$

$\boxed{f(x) = \frac{5}{2}x - 5}$

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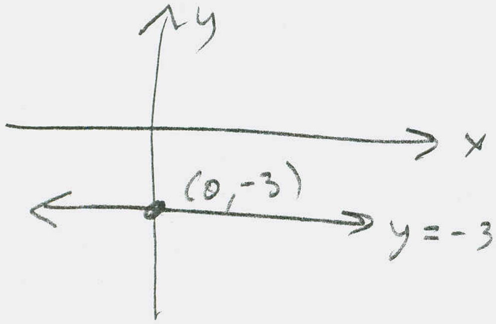
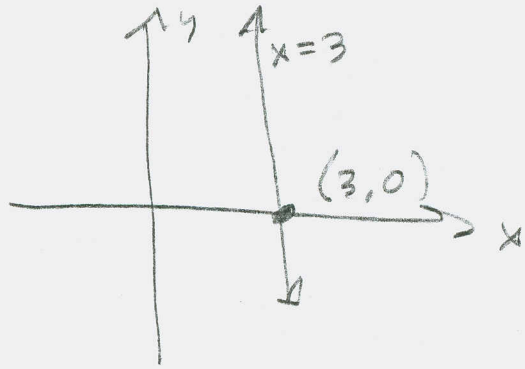
Graph the following linear equations:

7. (5 pts) $y = -3$



8. (5 pts) $x = 3$



9. (5 pts) Find the slope of the line through (3,- 1) and (5, 5).

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5-(-1)}{5-3} = \frac{6}{2} = 3$$

10. (5 pts) Find an equation of the line through (3,- 1) and (5, 5). Give your final answer in **point-slope form**. Hint: Use your work from #10. (Shouldn't take much room!)

$$\boxed{y = 3(x-3) - 1}$$

11. (5 pts) Re-write your answer to #11 in **slope-intercept form**.

$$y = 3x - 9 - 1$$

$$\boxed{y = 3x - 10}$$

12. (5 pts) Re-write your answer to #12 in **function notation**. (Shouldn't take much room!)

$$\boxed{f(x) = 3x - 10}$$

13. (5 pts) Re-write your answer to #13 in **standard form**.

$$-3x + y = -10$$

OR

$$3x - y = 10$$

35
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14. Suppose that the yearly cost of tuition and fees at a public four-year college can be estimated by the linear function

$$f(x) = 400x + 2800$$

where x is the number of years after 2000 and $f(x)$ is the total cost (in U.S. dollars).

(5 pts) a. ~~(3 pts)~~ What is the slope and *what does it mean* in the current situation?

$m = 400 \frac{\$}{yr}$ means tuition and fees total is rising at \$400 per year.

(5 pts) b. ~~(2 pts)~~ What is the y-intercept of this equation and *what does it mean*?

$(0, b) = 2800$ \$ means \$2800 in tuition & fees total was \$2800 in the year 2000.

15. (5 pts) Find an equation of the line through (3, - 1) that is parallel to $f(x) = \frac{5}{2}x - 2$. Give your answer in point-slope form. (Shouldn't take much room!)

$\boxed{y = \frac{5}{2}(x-3) - 1}$ STOP!

$y = \frac{5}{2}x - \frac{15}{2} - 1$

$y = \frac{5}{2}x - \frac{17}{2}$

16. (5 pts) Find an equation of the line through (3, - 1) that is perpendicular to $f(x) = \frac{2}{3}x - 2$. Give your answer in point-slope form. (Shouldn't take much room!)

$\boxed{y = -\frac{3}{2}(x-3) - 1}$ STOP!

$y = -\frac{3}{2}x + \frac{9}{2} - 1$

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

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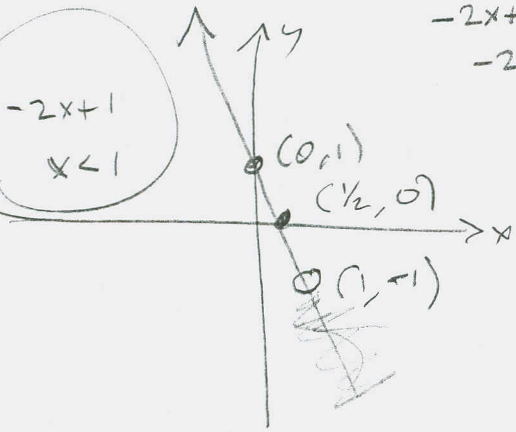
17. Suppose $f(x)=\begin{cases}-2x+1 & \text{if } x<1\\ x-1 & \text{if } x\geq 2\end{cases}$.

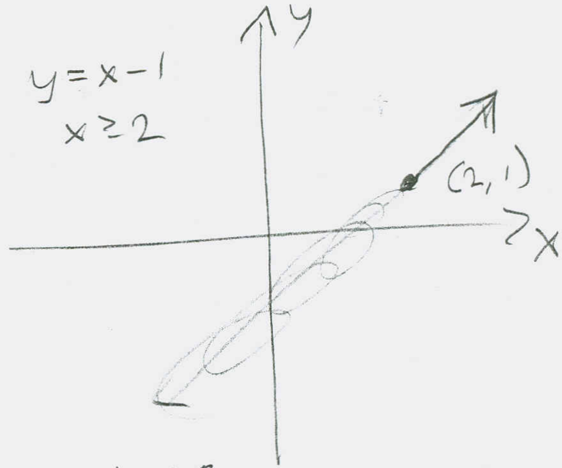
a. (5 pts) Graph this piecewise-defined function.

$y=-2x+1$
$x<1$



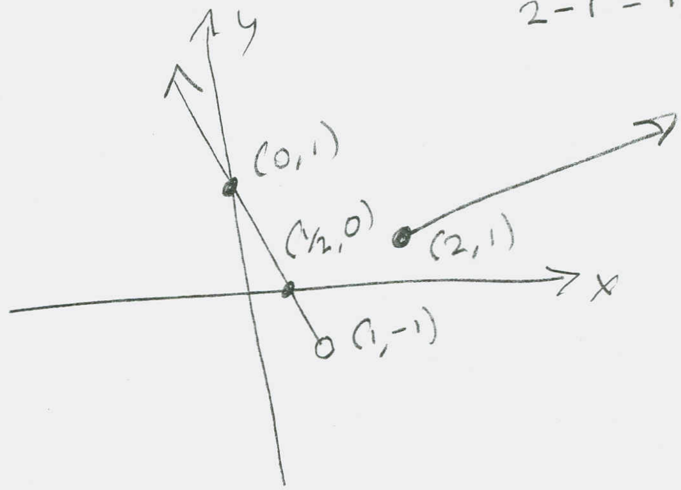
$-2x+1=0$
$-2x=-1$
$x=\frac{1}{2}$

$y=x-1$
$x\geq 2$



$x=1$:
$-2(1)+1=-1$
$(1,-1)$ o

$x=2$:
$2-1=1 \rightsquigarrow (2,1)$ ●



b. (3 pts ~~BONUS~~) State the domain of $f(x)$ in set-builder *and* interval notation.

5 pts

$\mathcal{D}=\{x \mid x<1 \text{ OR } x\geq 2\}$
$=(-\infty,1)\cup[2,\infty)$

c. (3 pts **BONUS**) State the range of $f(x)$ in set-builder *and* interval notation.

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$R=\{y \mid y>-1 \text{ OR } y\geq 1\}=\{y \mid y>-1\}$
$=(-1,\infty)$

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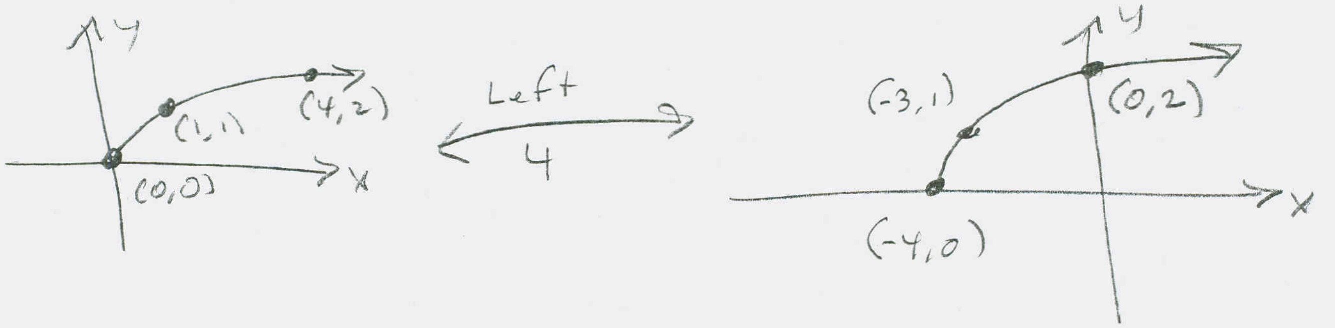
18. (5 pts) Sketch the graph of $g(x) = \sqrt{x+4}$ by transforming the basic function $f(x) = \sqrt{x}$. Two graphs, total. Key points: (0,0), (1, 1), and (4, 2).



19. (5 pts) Sketch the graph of $g(x) = -(x+1)^2 - 3$ by transforming the basic function $f(x) = x^2$. Be sure to do your vertical reflection, first. Then your horizontal and vertical shifts. (3 graphs, total. Key points: (- 1, 1), (0,0), and (1, 1))

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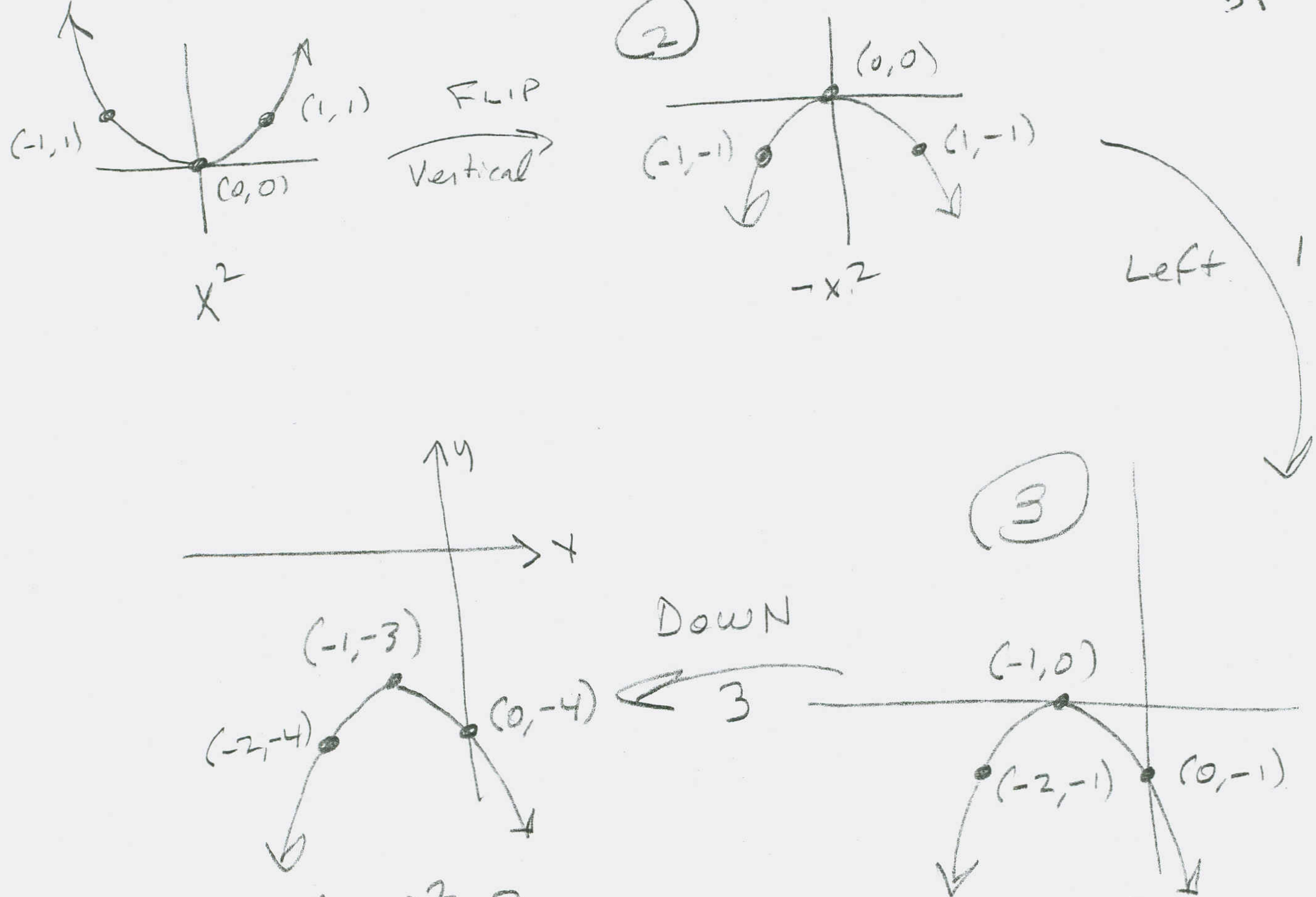

$g(x) = -(x+1)^2 - 3$

$= -f(x+1) - 3$

$-(x+1)^2$

$= -f(x+1)$

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