Name: Solutions PID: _____

NOTE: You must show the steps necessary to arrive at your answer unless otherwise noted. Use your judgment, if you can't do the entire problem in your head, then you probably should write down at least some intermediate steps.

This assignment has 6 pages. There are 38 total points.

Problem 1 (4 points). Describe the following sets of numbers in **interval** notation:

(a) $x \geq 5$

$[5, \infty)$

(b) $x < 2$ or $4 \leq x \leq 7$

$(-\infty, 2) \cup [4, 7]$

(c) The domain of $f(x) = \sqrt{x}$

$[0, \infty)$

(d) All $x \neq 6$

$(-\infty, 6) \cup (6, \infty)$

Problem 2 (4 points). Describe the following sets of numbers in **inequality** notation:

(a) $[5, 11)$

$5 \leq x < 11$

(b) $(-2, -1] \cup (1, 2)$

$-2 < x \leq -1$ or $1 < x < 2$

(c) $(-\infty, 1] \cup [2, \infty)$

$x \leq 1$ or $x \geq 2$

(d) All numbers EXCEPT those in $[5, 11)$

$x < 5$ or $x \geq 11$

Problem 3 (2 points). Let $r(k) = \frac{3}{k-2} + 1$. What is the formula for $r^{-1}(k)$?

Let $m = r(k) = \frac{3}{k-2} + 1$

Then $m = \frac{3}{k-2} + 1$

Solve for k: $m - 1 = \frac{3}{k-2}$

$(m-1)(k-2) = 3$

$k - 2 = \frac{3}{m-1}$

$k = \frac{3}{m-1} + 2$

$\Rightarrow \boxed{r^{-1}(m) = \frac{3}{m-1} + 2}$

Problem 4 (2 points). Suppose $L(a)$ is a linear function and $L(1) = -2$ and $L(4) = 6$. What is the formula for $L(a)$?

$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6-(-2)}{4-1} = \frac{6+2}{3} = \frac{8}{3}$

Solve for y-intercept: $L(a) = m \cdot a + b$

$L(a) = \frac{8}{3} \cdot a + b$

$L(1) = \frac{8}{3} \cdot 1 + b$

$-2 = \frac{8}{3} + b$

$-\frac{6}{3} - \frac{8}{3} = b$

$b = \frac{-14}{3}$

$\Rightarrow \boxed{L(a) = \frac{8}{3}a - \frac{14}{3}}$

Problem 5 (2 points). Let $h(y) = \frac{1}{3}y - 2$.

(a) Write down the formula for a line which is parallel to $h(y)$.

Any line with the same slope works

$g(y) = \frac{1}{3}y + 4$, for example

(b) Write down the formula for a line which is perpendicular to $h(y)$.

Any line where the slopes multiply to -1 works.

Let m be my new slope.

Need $m \cdot \frac{1}{3} = -1 \Rightarrow m = -3$. New line: $\boxed{k(y) = -3y + 1}$

Problem 6 (6 points). Match each line in the figure with its corresponding formula. Next to each formula write the letter of the matching line.

C $f(x) = 2$

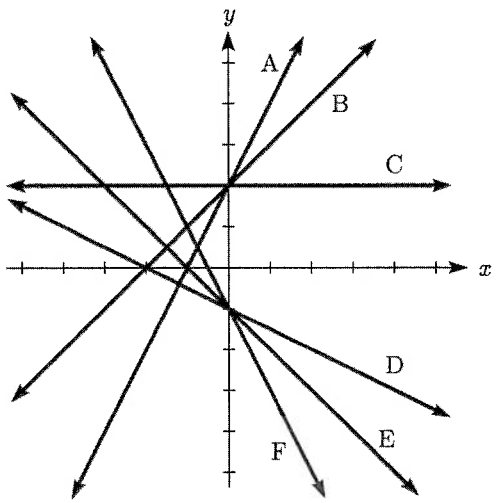
A $f(x) = 3x + 2$

E $f(x) = -x - 1$

D $f(x) = \frac{-1}{2}x - 1$

B $f(x) = x + 2$

F $f(x) = -1 - 2x$



Problem 7 (4 points). Let $a(x) = x - \frac{1}{2}$ and $b(x) = -2x + 1$. At what point do the lines defined by $a(x)$ and $b(x)$ intersect? Write your answer as a coordinate pair.

$a(x) = b(x)$

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

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

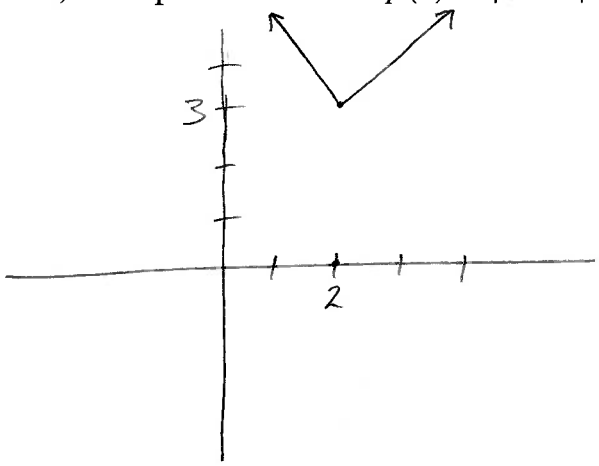
$3x = \frac{3}{2}$

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

$a(\frac{1}{2}) = \frac{1}{2} - \frac{1}{2} = 0$

Intersects at $(\frac{1}{2}, 0)$

Problem 8 (2 points). Graph the function $p(z) = |z - 2| + 3$.



Problem 9 (4 points). Solve the equation $-3|x + 2| = -6$ for x. There are two solutions.

$-3|x+2| = -6$

$|x+2| = 2$

Two Cases

$x+2 = 2$ $\quad$ $-(x+2) = 2$

$x = 0$ $\quad$ $-x - 2 = 2$

$-x = 4 \Rightarrow x = -4$

Answer: $x = 0$ or $x = -4$

Problem 10 (4 points). Solve the inequality $|4x + 3| \leq 5$ for x.

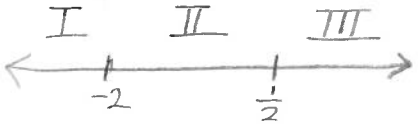
Solve equality first: $|4x+3| = 5$

$4x+3 = 5$ or $-(4x+3) = 5$

$4x = 2$ $\quad 4x+3 = -5$

$x = \frac{1}{2}$ $\quad 4x = -8$

$x = -2$



Number Line Test:

I: Test $x = -3$. $|4\cdot(-3)+3| = |-12+3| = |-9| = 9$ ✗

II: Test $x = 0$. $|4\cdot 0+3| = |3| = 3$ ✓

III: Test $x = 1$. $|4\cdot 1+3| = |7| = 7$ ✗

So only region II satisfies the inequality:

$\boxed{-2 \leq x \leq \frac{1}{2}}$

Problem 11 (4 points). Consider the polynomial function $p(x) = 4x^5 - 2x^4 - 2x^2 + 5x$.

(a) What is the degree of p?

5

(b) What is the leading coefficient of p?

4

(c) What is the leading term of p?

$4x^5$

(d) Does p have an *absolute* minimum? Or does it tend to $-\infty$ in some direction?

No absolute minimum

[OPTIONAL] **Survey Questions.** *[Click on the blue text for more info]*

Have you attended OASIS drop-in tutoring for Math 3C? *(circle one)*

yes **no** **no, and I don't know what that is**

Have you attended the Supplemental Instruction sessions for Math 3C? *(circle one)*

yes **no** **no, and I don't know what that is**