MATH 120
SPRING 2022   NAME:
EXAM 1

1. [5 pts. each] List the quadrants satisfying each condition.

   (a) $y/x < 0$

   (b) $x < 0$ and $xy > 0$

2. [10 pts.] Graph $y = -\frac{1}{2}|x|$, letting $x = -4, -2, 0, 2, 4$.

3. [10 pts. each] Find the solution set of each equation.

   (a) $5x - (2x + 2) = x + (3x - 5)$

   (b) $\dfrac{6}{x+3} - \dfrac{5}{x-2} = \dfrac{-20}{x^2 + x - 6}$

4. [10 pts.] The length of a rectangular pool is 6 meters less than twice the width. If the pool's perimeter is 126 meters, what are its dimensions?

5. [10 pts.] Solve $\dfrac{1}{p} - \dfrac{2}{q} = \dfrac{1}{f}$ for p.

6. [10 pts. each] Express each in the standard form $a + bi$.

   (a) $(5 - 2i)(3 + i)$

   (b) $\dfrac{3 - 2i}{1 - i}$

7. [5 pts.] Do a long division that quickly determines whether i^{423} equals $1, -1, i,$ or $-i$.

8. [10 pts. each] Solve each by the method indicated.

   (a) $3(x + 4)^2 = 21$ by the square root property

   (b) $x^2 + 3x - 1 = 0$ by completing the square

9. [15 pts.] A machine produces topless boxes using square sheets of metal. The machine cuts equal-sized squares measuring three centimeters on a side from the corners of the sheet, and then folds up the resultant flaps to form the four sides of an open box. If each box must have a volume of 80 cm^3, find the dimensions of the box.

10. 10 pts. each   Solve each equation.

(a) $\sqrt{2x-3} - \sqrt{x-2} = 1$

(b) $2x^{2/3} + 7x^{1/3} - 15 = 0$

(c) $|x+1| + 6 = 2$

11. 10 pts. each   Solve each inequality, stating the solution set in interval notation.

(a) $7 - \frac{4}{5}x \le \frac{3}{5}$

(b) $|2(x-1) + 4| < 8$

(c) $-3|x+7| \ge -27$