MATH 120
SPRING 2024 NAME:
EXAM 1

1. [5 pts. each] List the quadrants satisfying each condition, or state that no quadrant works.
   (a) $y^2/x > 0$
   (b) $xy < 0$

2. [10 pts.] Graph $y = -|x| + 2$, letting $x = -4, -2, 0, 2, 4$.

3. [10 pts. each] Find the solution set of each equation.
   (a) $5x - (2 - 2x) = x + (3x - 5)$
   (b) $\dfrac{6}{x+3} + \dfrac{20}{x^2+x-6} = \dfrac{5}{x-2}$

4. [15 pts.] A transponder for a toll bridge costs \$27.50. With the transponder, the toll is \$5 each time the bridge is crossed. The only other option is toll-by-plate, for which the toll is \$7.50 each time the bridge is crossed. How many times would the bridge need to be crossed for the costs of the two toll options to be the same?

5. [10 pts.] Solve $IR + Ir = E$ for I.

6. [10 pts. each] Express each in the standard form $a + bi$.
   (a) $(6 - i)(3 - 4i)$
   (b) $\dfrac{4i}{2+i}$

7. [5 pts.] Do a long division to determines whether i^{833} equals 1, -1, i, or $-i$. Show the long division work!

8. [10 pts. each] Solve each by the method indicated, writing complex-valued solutions in standard form.
   (a) $3x^2 = 6x - 1$ by the quadratic formula.
   (b) $x^2 + 6x - 5 = 0$ by completing the square.

9. [15 pts.] A rectangular parking lot has a length that is 3 meters greater than the width. The area of the lot is 180 square meters. Find the length and width.

10. [10 pts. each] Solve each equation.

(a) $\sqrt{x-4}+\sqrt{x+1}=5$

(b) $x^{1/2}+3x^{1/4}-10=0$

(c) $2|x-3|-6=10$

11. [10 pts. each] Solve each inequality, stating the solution set in interval notation when appropriate.

(a) $6x-9\geq -4x-3$

(b) $\left|\dfrac{2x+6}{3}\right|>2$