MATH 125
SPRING 2022 NAME:
EXAM 2

1. [10 pts.] A parabolic arch has a span of 120 meters and a maximum height of 25 meters. Choose suitable rectangular coordinate axes and find the equation of the parabola. Then calculate the height of the arch 10 meters from the center.

2. [10 pts.] Find the complex zeros of $f(x) = -2x^2 + 8x + 1$.

3. [10 pts.] Solve $5 - \left|\frac{x}{2}\right| = 3$.

4. [10 pts.] Solve $|1 - 4x| - 8 < -2$ and write the solution in interval notation.

5. [10 pts.] Construct a polynomial function of degree 5 having zeros 0 (with multiplicity 2), 2 (with multiplicity 1), and -1 (with multiplicity 2), and whose graph contains the point $(1, 4)$. Do not bother to expand the product.

6. [10 pts.] Construct a polynomial function of degree 3 having real coefficients and zeros -4 and $2+i$. Expand the product to write the polynomial in standard form.

7. [10 pts.] Let $G(x) = 2x^4 + 11x^3 - 5x^2 - 43x + 35$. Use the Rational Zeros Theorem to find all the real zeros of G, then use the zeros to factor $G(x)$ over the real numbers.

8. [10 pts.] Find all solutions (real or complex) to the equation

$$x^3 - 8x^2 + 25x - 26 = 0.$$

9. [10 pts.] Find all asymptotes for the rational function

$$\Psi(x) = \frac{x^3 + 2x}{x^2 - 7x + 12}.$$

10. [10 pts. each] Solve each inequality algebraically, writing the solution set in interval notation.
    (a) $x^3 + x^2 < 4x + 4$
    (b) $\dfrac{2x - 6}{1 - x} \leq 2$

11. [10 pts.] For what positive numbers will the cube of a number exceed four times its square?