

1. 15 pts. Zebediah Torkelson has 80 meters of fencing to enclose a rectangular region. Construct a quadratic function to determine what the dimensions of the rectangle should be to maximize the enclosed area. What is the maximum area?
2. 10 pts. Find the complex zeros of $f(x) = 3x^2 + 6x + 4$.
3. 10 pts. Solve $|x^2 + 3x| = 5$.
4. 10 pts. Solve $|x + 6| \geq 7$ and write the solution in interval notation.
5. 15 pts. Construct a polynomial function of degree 6 having zeros 3 (with multiplicity 2), -4 (with multiplicity 1), and 1 (with multiplicity 3), and whose graph contains the point $(-1, 20)$. Do not bother to expand the product.
6. 15 pts. Construct a polynomial function of degree 3 having real coefficients and zeros 6 and $1 - 2i$. Expand the product to write the polynomial in standard form.
7. 15 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. Given that $3i$ is a zero of

$$H(x) = 3x^4 + 5x^3 + 25x^2 + 45x - 18,$$

find the remaining zeros of H .
10. 15 pts. Find all asymptotes for the rational function

$$K(x) = \frac{x^3 + x}{x^2 - 5x + 6}.$$
11. 10 pts. each Solve each inequality algebraically, writing the solution set in interval notation.

 - (a) $x^4 > 16$
 - (b) $x^3 - 2x^2 - 3x < 0$.
 - (c) $\frac{3x - 5}{x + 2} \geq 2$