

Math 171
Polynomials and Rational Functions

Find the vertex of the parabola:

1. $x^2 + 3x + 3$

Graph by hand by finding the vertex, axis of symmetry, x and y intercepts, leading coefficient, and extra points. Give the domain and range of the function:

2. $x^2 - 7x + 12$

Find the zeros of the function, state the multiplicity, and state if the line crosses or touches the x-axis:

3. $2x^3 - 4x^2 + 2x$

Prove the function has a zero within the interval by using the Intermediate Value Theorem:

4. $f(x) = x^4 - x^3 + 3x^2 - 5$; (0, 2)

Divide using long division:

5. $(6x^2 + 3x^4 - 3x + 2) \div (x + 3)$

Divide using synthetic division:

6. $(7x - 5x^5 + 4x^2 - 8) \div (x + 3)$

List all possible zeros and find all zeros of the function.

7. $x^3 - x^2 - x - 2 = 0$

Find all zeros of the function by using the Rational Zero Theorem, Descartes' Rule of Signs and quadratic formula.

8. $4y^5 + 12y^4 - 41y^3 - 99y^2 + 10y + 24 = 0$

Graph the function by finding horizontal, vertical, and/or slant asymptotes, symmetry, x and y intercepts, and extra points if possible.

9. $\frac{12x}{3x^2 + 1}$

$$10. \frac{4x^3 - 7}{8x^3 + 64}$$

$$11. \frac{x^2 + 5}{x + 1}$$

Solve the inequality and write answer in interval notation.

$$12. x^3 + x^2 + 5x + 5 < 0$$

$$13. \frac{x + 7}{x^2 + 5x - 6} \geq 0$$

Solve:

14. The cost of a product is a function of the number of products produced as given in the equation where x is the number of products produced and $C(x)$ is in dollars.

$$C(x) = \frac{140x}{x - 3}$$

- Find and interpret $C(20)$, $C(40)$, and $C(60)$.
- Where is the vertical asymptote?
- Graph the function.