

2.1 Quadratic Functions and Models

- Standard form for a quadratic function $f(x) = a(x - h)^2 + k$
- Finding a vertex and axis of symmetry for a quadratic function
- Finding x -intercepts of quadratic functions
- Graphing quadratic functions
- Finding a quadratic function given vertex and a point of the graph
- APPLICATIONS: Finding a maximum/minimum ($h = \frac{-b}{2a}$ and $k = f(h)$)

2.2 Polynomial Functions of Higher Degree $f(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_2 x^2 + a_1 x + a_0$

- The Leading Coefficient Test (end behavior of graph)
- Finding zeros of a polynomial function and their multiplicities
- Sketching the graph of a polynomial function (using a chart)

2.3 Polynomial and Synthetic Division

- Long division of polynomials
- Division algorithm $f(x) = d(x) \cdot q(x) + r$
- Synthetic division of polynomial by $x - k$
- Uses of the remainder in synthetic division
 1. Evaluating $f(x)$
 2. Finding factors of polynomial
 3. Finding zeros of a polynomial equation

2.5 Zeros of Polynomial Functions

- Rational Zero Test – finding possible rational factors $\frac{p}{q}$
- Finding zeros from a graph of the function.
- Conjugate pairs $a + bi$ and $a - bi$
- Finding a polynomial given the zeros
- Linear factorization of a polynomial
- Descartes's Rule of signs to determine number of positive and negative zeros
- Find upper and lower bounds of zeros using synthetic division

2.6 Rational Functions $f(x) = \frac{N(x)}{D(x)}$

- Domain
- x - and y - intercepts
- Vertical asymptotes and holes
- Horizontal and Slant asymptotes
- Sketching graph of rational functions (using a chart)