Section 1.3 Linear and Quadratic Functions

# Topic 1: Linear Functions and Equations

A **linear equation in two variables *x* and *y*** is an equation that can be written in

* **standard form: **

where *A*, *B*, and *C* are constants (integers where possible), *A* and *B* are not both 0, and .

* **slope-intercept form**: 

where *m* is the slope of the line and *b* is the *y*-intercept (where the graph of the line crosses the *y*-axis).

* **point-slope form:**  

where *m* is the slope of the line and is a point on the line.

If  and  are two points on a line with , then **the slope**, *m*, of the line is

.

**Geometric Interpretation of Slope**

| **Slope** | **Description of line** | **Example graph** |
| --- | --- | --- |
| positive | rises as *x* moves from left to right | a line rising from quadrant 3 into quadrant 1 |
| negative | falls as *x* moves from left to right | a line falling from quadrant 2 into quadrant 4 |
| 0 | horizontal | a horizontal line moving from quadrant 2 into quadrant 1 |
| undefined | vertical | a vertical line moving from quadrant 1 into quadrant 4 |

# Topic 2: Quadratic Functions and Equations

If *a*, *b*, and *c* are real numbers with , then the function  is a **quadratic function** written in standard form, and its graph is a **parabola**.

An *x* intercept of a function is also called a **zero** of a function. The *x* intercepts of a quadratic function can be found by solving the quadratic equation, , for *x*. Several methods for solving quadratic equations are discussed in the book’s Appendix. The most popular of these is the **quadratic formula**. If , , then the *x-*intercepts are

, provided $.$

The solution(s) provided by quadratic formula are always zeros of the function regardless of the sign of the discriminant; they are only *x*-intercepts if the solution(s) are real.

# Topic 3: Properties of Quadratic Function and Their Graphs

If *a* is a real number with  and  is the vertex of the parabola, then  is a **quadratic function** written in vertex form.