Lesson 8

Read Chapter 7

Quadratic functions. Parabolas

A quadratic function is a function given by a quadratic formula :

$$f(x) = ax^2 + bx + c \quad a \neq 0$$

The graph of a quadratic function is a parabola

The vertex of a parabola is a point (h, k) that is either the highest (when $a < 0$) or the lowest (when $a > 0$) point of the parabola

Vertex form: $y = a(x - h)^2 + k$

$x = h$ is the axis of symmetry for a parabola with vertex (h, k)

The parabola

$$f(x) = ax^2 + bx + c$$

has vertex

$$h = -\frac{b}{2a} \quad k = f(-\frac{b}{2a})$$

From vertex form to standard form

From standard form to vertex form

Given the parabola $y = 2x^2 + x + 6$, put it in vertex form and draw it.

Parabola through three points

Find the equation of the parabola through (1,2),(-1,1) and (2,3)

Find the equation of the parabola with vertex (1,2) through the point (4,5)

Fact: the minimum value of $f(x) = ax^2 + bx + c$ $(a > 0)$ is at the vertex
so we have a min at $x = -\frac{b}{2a}$
min value $y = f(-\frac{b}{2a})$