Lesson 3.2.1

Saturday, February 4, 2017 4:39 PM

PREC 11 **3.2 Investigating Quadratic Functions in Standard Form**

Polynomial of degree: 2

A **quadratic function** has a defining equation that can be written as:

$y = ax^2 + bx + c$ or $f(x) = ax^2 + bx + c$ (standard form)

- a determines the shape and whether the graph opens upwards or downwards
- b influences the position of the graph
- c determines the y-intercept of the graph

$a = +$ $a = -$

The graph of a quadratic function is a **parabola**.

Examples of quadratic functions: $y = x^2 - 7$

$y = 3(x-4)^2 + 8$

$f(x) = (x-1)(x+7)$

$f(x) = 2x^2 + 30x - 24$

$y = x + 27 - 4x^2$

Not quadratic functions: $y = x^2 - 3\sqrt{x}$ ← can only have $x^2 + x$

$y = 7x(x^2 - 9)$

$y = 1 + 2x^{600}$

Properties of a parabola:

i. vertex max or min. point on the parabola

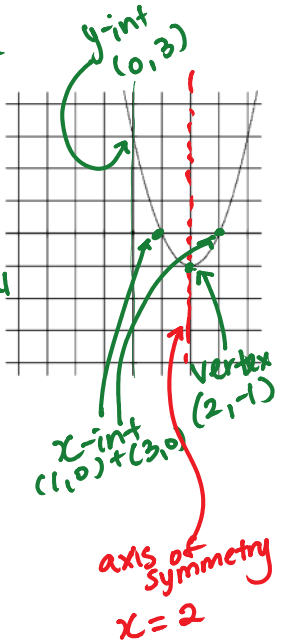
ii. y-intercept where graph crosses y-axis

iii. x-intercept where graph crosses x-axis

iv. axis of symmetry line about which is symmetrical (always goes through vertex)

v. domain all possible x-values

vi. range all possible y-values



D: $x \in \mathbb{R}$

R: $y \geq -1$

Graph on Calculator "y="

Example 1: $y = x^2 - 7x + 10$

CALC (2nd Trace) 3: min 4: max

i. vertex (3.5, -2.25)

CALC 1: Value (x=0)

ii. *y*-intercept (0, 10)

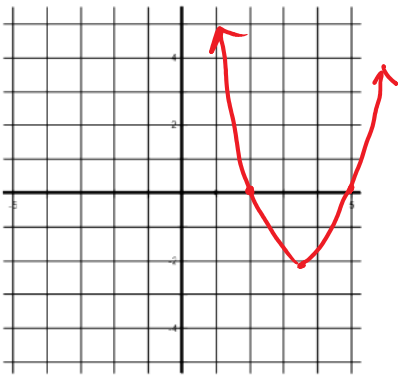
CALC 2: zero

iii. *x*-intercept (2, 0) and (5, 0)

iv. axis of symmetry $x = 3.5$

v. domain $x \in \mathbb{R}$

vi. range $y \geq -2.25$



Example 2: $y = x^2 - 3x + 4$

i. vertex (1.5, 1.75)

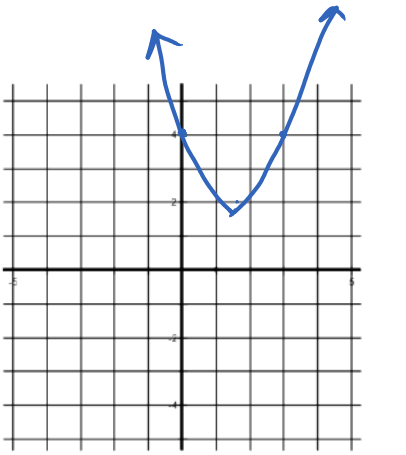
ii. *y*-intercept 4

iii. *x*-intercept none

iv. axis of symmetry $x = 1.5$

v. domain $x \in \mathbb{R}$

vi. range $y \geq 1.75$



Assignment: pg. 174 ~~#1-6~~ #1 talk w partners #2-6