2.1 Quadratic Functions 10/06-7

Solution – a number that, when substituted for the value produces a <u>true</u> statement.

Quadratic Equation – a second degree equation written in the form:

$$ax^2 + bx + c = 0, \quad a \neq 0$$

Factoring:

Ex (1)

$$3x^2 - x = 10$$
$$-10 \quad -10$$
$$3x^2 - x - 10 = 0$$

$a = 3 \quad b = -1 \quad c = -10$

$a \cdot c$

-30

$-2 = \frac{-6}{3} \quad \frac{5}{3} = \frac{5}{3}$

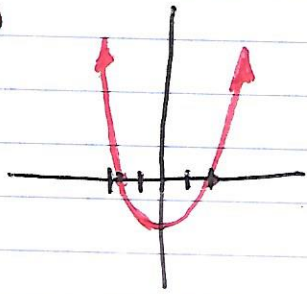
-1

$\therefore (x-2)(x+\frac{5}{3})$ ← Bottoms up

Factors: $(x-2)(3x+5)$

Solutions: $x = 2 \quad x = -\frac{5}{3}$

(x-intercepts, zeros, roots)



Ex. (2)

Square root

$x^2 = k$, $\frac{3}{3}x^2 = \frac{9}{3}$

$\sqrt{x^2} = \sqrt{3}$

$x = \pm\sqrt{3}$

$a(x-h)^2 = k$, $\frac{2}{2}(x+4)^2 = \frac{6}{2}$

$\sqrt{(x+4)^2} = 3$

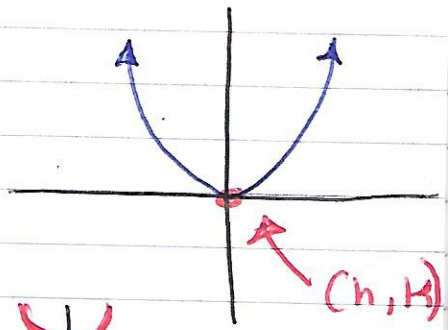
$x + 4$

$x = \pm\sqrt{3} - 4$

Vertex form

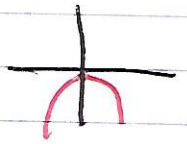
$f(x) = a(x-h)^2 + k$

(h, k) ← Vertex



when $a > 0$, parabola opens up

when $a < 0$, parabola opens down



Ex. (3)

from standard to Vertex form

Identify the Vertex.

$f(x) = 2x^2 + 8x + 7$

$0 = 2x^2 + 8x + 7$

$-7 \quad\quad -7$

$-7 = (2x^2 + 8x)$

① Write equation in $c = ax^2 + bx$

$-7 = 2(x^2 + 4x)$

② Factor so $a = 1$

$-7 + 2(4) = 2(x^2 + 4x + 4)$

③ Add $(\frac{b}{2})^2$ to both sides

$-7 + 8 = 2(x+2)^2$

④ Rewrite the left side

$-1 = 2(x+2)^2$

⑤ Make equal to zero

$+1 \quad\quad +1$

$= 2(x+2)^2 + 1$ $\quad a(x-h)^2 + k$

Vertex $(h, k) \Rightarrow (-2, 1)$

CW p. 96 # 17 – 43 odd