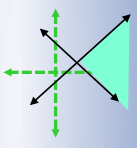
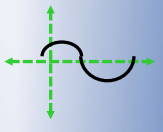
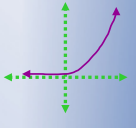
$5x-2y \leq 75$



$\begin{bmatrix} a & b \\ c & d \end{bmatrix}$



$S = Pe^{rt}$



$APY = (1+\frac{r}{n})^{n}-1$

Math 1090 ~ Business Algebra

Section 3.1 Quadratic Equations in One Variable

Objectives:

- Identify a quadratic equation in one variable.
- Apply the Zero Product Property to solve quadratic equations in one variable.
- Apply four strategies for solving a quadratic equation in one variable.

Definition: A Quadratic Equation can be written in the form

$ax^2 + bx + c = 0$, where $a, b, c \in \mathbb{R}$, $a \neq 0$

a, b, c are constants

Ex 1: Solve $5x^2 - 32 = x^2 + 8$

use ①

$4x^2 - 32 = 8$

$4x^2 = 40$

$x^2 = 10$

$x = \pm\sqrt{10}$

Ex 2: Solve $2x(5x + 6) = 16$

use ②

$10x^2 + 12x = 16$

$10x^2 + 12x - 16 = 0$

$2(5x^2 + 6x - 8) = 0$

$5 \cdot -8 = -40$

$10 \cdot -4$

$2(5x^2 + 10x - 4x - 8) = 0$

$2(5x(x+2) - 4(x+2)) = 0$

$2(x+2)(5x-4) = 0$

$x + 2 = 0$ or $5x - 4 = 0$

$x = -2$ or $5x = 4$

$x = \frac{4}{5}$

Strategies to Solve

1. Square Root Technique
   - only works if we have x written once in the quadratic eqn.
2. Factor Technique
   - only works sometimes
   - must have zero on one side of eqn.
3. Completing the Square
   - always works
4. Quadratic Formula
   - always work

if $ax^2 + bx + c = 0$

then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Ex 3: Solve $y^2 + y - 4 = 0$

use (4)

$a=1,\ b=1,\ c=-4$

$$y = \frac{-1 \pm \sqrt{1^2-4(1)(-4)}}{2(1)} = \frac{-1 \pm \sqrt{1+16}}{2}$$

$$y = \frac{-1 \pm \sqrt{17}}{2}$$

Ex 4: Solve $x^2 + 4 = 6x$

use (3)

$\left(\frac{-6}{2}\right)^2 = (-3)^2 = 9$

$x^2 - 6x + 4 = 0$

$(x^2 - 6x + 9) + 4 - 9 = 0$

$(x-3)^2 + -5 = 0$

$(x-3)^2 = 5$

$x - 3 = \pm\sqrt{5}$

$x = 3 \pm \sqrt{5}$

Ex 5: Solve $\frac{1}{x-10}-\frac{1}{x-9}=1$ (rational eqn)

$x \neq 10, 9$

$(x-10)(x-9)\left(\frac{1}{x-10}-\frac{1}{x-9}\right)=1(x-10)(x-9)$

$\frac{(x-10)(x-9)}{(x-10)}-\frac{(x-10)(x-9)}{(x-9)}=(x-10)(x-9)$

$x-9-(x-10)=x^2-9x-10x+90$

$-9+10=x^2-19x+90$

$1=x^2-19x+90$

$0=x^2-19x+89$

use (4)

$a=1,\ b=-19,\ c=89$

$x=\frac{19\pm\sqrt{(-19)^2-4(1)(89)}}{2(1)}$

$x=\frac{19\pm\sqrt{5}}{2}$