MATH 0270/1314 COLLEGE ALGEBRA Week 12 Monday 4/22

Comparing and Contrasting Typical Linear & Quadratic Equations

LINEAR EQUATIONS

e.g. $3x + 2 = 23$

DEGREE : 1 (highest exponent)

TYPICAL # of Solutions : 1.

QUADRATIC EQUATIONS

e.g. $x^2 + 5x + 6 = 0$.

DEGREE : 2

TYPICAL # of Solutions : 2.

THREE METHODS FOR SOLVING EQUATIONS

(1). The Factoring Method.

e.g. $x^2 + 5x + 6 = 0$

$(x+2)(x+3) = 0$

$(x+2) = 0$ or $(x+3) = 0$

$\boxed{x = -2}$ or $\boxed{x = -3}$

plug in and check.

$(-2)^2 + 5(-2) + 6 = 4 - 10 + 6 = 0$ ✓

plug in and check.

$(-3)^2 + 5(-3) + 6 = 9 - 15 + 6 = 0$ ✓

procedure of solving by factoring

(1) set to zero

(2) factor the polynomial

(3) set each factor to zero and solve

WEBASSIGN PRACTICE

1.4(1) $14x^2 + 2x = 0$ ← common factor

$\Rightarrow 2x(7x+1) = 0$

$\Rightarrow 2x = 0$ or $7x + 1 = 0$.

$\Rightarrow \boxed{x = 0}$ or $\boxed{x = -\frac{1}{7}}$

☆ Properties of Zero.

(1). any number plus zero equals itself

(2) any number multiplied by zero equals zero.

(3) If $a \cdot b = 0$, then either $a = 0$ or $b = 0$

1.4(2). $36x^2 - 1 = 0$. ← difference of two squares

$\Rightarrow (6x+1)(6x-1) = 0$.

$\Rightarrow 6x+1 = 0$ or $6x-1 = 0$

$\Rightarrow \boxed{x = -\frac{1}{6}}$ or $\boxed{x = \frac{1}{6}}$

solutions are opposites when solving a quadratic equation by factoring the difference of two squares.

another example of this

$4x^2 - 25 = 0$.

$\Rightarrow (2x+5)(2x-5) = 0$.

$\Rightarrow 2x+5 = 0$ or $2x-5 = 0$.

$\Rightarrow \boxed{x = -\frac{5}{2}}$ or $\boxed{x = \frac{5}{2}}$

1.4(3) $x^2 - 3x + 2 = 0$.

$\Rightarrow (x-2)(x-1) = 0$

$\Rightarrow x-2 = 0$ or $x-1 = 0$

$\Rightarrow \boxed{x = 2}$ or $\boxed{x = 1}$

1.4(4) $4x^2 + 36x + 81 = 0$ ← $4x^2$ and 81 are both perfect squares, so possible factor as $(\ )^2$

$\Rightarrow (2x+9)^2 = 0$ ← conclude directly that the two solutions coincide, so only have to solve $2x+9=0$ once.

$\Rightarrow (2x+9)(2x+9) = 0$

$\Rightarrow 2x+9 = 0$ or $2x+9 = 0$ ← solutions are identical

$\Rightarrow x = -\frac{9}{2}$ or $x = -\frac{9}{2}$.

1.4(5) $2x^2 = 7x + 15$

$2x^2 - 7x - 15 = 0$

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

$2x + 3 = 0$ or $x - 5 = 0$

$\boxed{x = -\frac{3}{2}}$ or $\boxed{x = 5}$