

COLLEGE ALGEBRA

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GPS # 14

2.2 SOLVING QUADRATIC EQUATIONS II

Class Time: T/Th 11:30 Date: 2-5-08

Useful Guidelines:

The solutions of $ax^2 + bx + c = 0 (a \neq 0)$ are given by $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. "Quadratic Formula" *rw*

If $a, b,$ and c are integers, then the number and type of solutions can be predicted as follows:

- * If the discriminant $b^2 - 4ac > 0$, then we'll have two real solutions.
- * If the discriminant $b^2 - 4ac = 0$, then we'll have only one real solution.
- * If the discriminant $b^2 - 4ac < 0$, then we'll have two complex solutions.

1. Solve each equation using the quadratic formula and give the solution set.

a) $x^2 - x - 12 = 0$

$A = 1$
 $B = -1$
 $C = -12$

$$\frac{1 \pm \sqrt{(-1)^2 - 4(1)(-12)}}{2(1)}$$

$$\frac{1 \pm \sqrt{49}}{2} = \frac{1 \pm 7}{2} = \{4, -3\}$$

b) $2x^2 - 3x + 3 = 0$

$A = 2$
 $B = -3$
 $C = 3$

$$\frac{3 \pm \sqrt{(-3)^2 - 4(2)(3)}}{2(2)}$$

$$x = \frac{3 \pm \sqrt{-15}}{4}$$

$$x = \frac{3 \pm i\sqrt{15}}{4} = \frac{3}{4} \pm \frac{\sqrt{15}}{4}i$$

$$\left\{ \frac{3}{4} \pm \frac{\sqrt{15}}{4}i \right\}$$

2. Use the discriminant to predict whether the solutions to each equation are

A. one real solution; B. two real solutions; C. two complex solutions.

a) $x^2 + 5x + 4 = 0$

$A = 1$
 $B = 5$
 $C = 4$

$$5^2 - 4(1)(4) = 9 > 0$$

$$x^2 + 5x + 4 = 0$$

$$(x+1)(x+4) = 0$$

2 real solutions
 B

b) $2x^2 - 4x + 2 = 0$

$A = 2$
 $B = -4$
 $C = 2$

$$(-4)^2 - 4(2)(2) = 0$$

$$16 - 16 = 0$$

1 real solution
 A

c) $5x^2 - 3x + 7 = 0$

$A = 5$
 $B = -3$
 $C = 7$

$$(-3)^2 - 4(5)(7) = -131 < 0$$

2 complex solutions
 C

d) $x^2 + 3x - 1 = 0$

$A = 1$
 $B = 3$
 $C = -1$

$$(3)^2 - 4(1)(-1) = 13 > 0$$

2 real solutions
 A

3. If a ball is thrown upward at 32 feet per second from a height of 6 feet, the height of the ball can be modeled by $S(t) = 6 + 32t - 16t^2$ feet, where t is the number of seconds after the ball is thrown. How long after the ball is thrown is the height 36 feet?

$t = ?$ $S(t) = 36$ $b^2 - 4ac$

$$36 = 6t + 32t - 16t^2$$

$$8t^2 - 32t + 30 = 0$$

$$2(4t^2 - 16t + 15) = 0$$

$$4t^2 - 16t + 15 = 0$$

$$(-16)^2 - 4(4)(15) = 16 = 4^2 > 0$$

2 real solutions

$$(2t - 3)(2t - 5)$$

$$2t - 3 = 0$$

$$t = \frac{3}{2}s \text{ or } t = \frac{5}{2}s$$

$$\left\{ \frac{3}{2}s, \frac{5}{2}s \right\}$$