

Describe the number and type of roots using the Discriminant.  $\rightarrow b^2 - 4ac$ 

1.  $x^2 - 1x - 12 = 0$

$a=1 \quad b=-1 \quad c=-12$

disc =  $(-1)^2 - 4(1)(-12)$

$= 49$  (perfect sq!)

2 real rational roots

2.  $x^2 + 3x - 3 = 0$

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

disc =  $(3)^2 - 4(1)(-3)$

$= 21$  (+ non-per sq)

2 real irrational roots

3.  $x^2 - 2x + 5 = 0$

$a=1 \quad b=-2 \quad c=5$

disc =  $(-2)^2 - 4(1)(5)$

$= -16$  (neg #!)

2 imaginary/complex roots

4.  $-12x^2 + 5x + 2 = 0$

$a=-12 \quad b=5 \quad c=2$

disc =  $(5)^2 - 4(-12)(2)$

$= 121$  (per sq!)

2 real rational roots

5.  $9x^2 - 6x - 4 = -5$

$9x^2 - 6x + 1 = 0$

disc =  $(-6)^2 - 4(9)(1)$

$= 0!$

1 real rational root

6.  $4x^2 + 7 = 9x$

$4x^2 - 9x + 7 = 0$

disc =  $(-9)^2 - 4(4)(7)$

$= -31$  (Neg #!)

2 imaginary/complex roots

Solve the following using the Quadratic Formula. Write answers in set notation.

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

7.  $x^2 - 30x - 64 = 0$

$a=1 \quad b=-30 \quad c=-64$

$$\frac{-(-30) \pm \sqrt{(-30)^2 - 4(1)(-64)}}{2(1)}$$

$$\frac{30 \pm \sqrt{1156}}{2}$$

$$\frac{30 \pm 34}{2}$$

$$\frac{30+34}{2} \quad \frac{30-34}{2}$$

$$x=32 \quad x=-2$$

8.  $x^2 - 4x + 7 = 0$

$a=1 \quad b=-4 \quad c=7$

$$\frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(7)}}{2(1)}$$

$$\frac{4 \pm \sqrt{-12}}{2}$$

$$\frac{4 \pm 2i\sqrt{3}}{2}$$

$$2 \pm i\sqrt{3}$$

$$2 + i\sqrt{3}, 2 - i\sqrt{3}$$

9.  $4x^2 + 81 = 36x$

$4x^2 - 36x + 81 = 0$

$a=4 \quad b=-36 \quad c=81$

$$\frac{-(-36) \pm \sqrt{(-36)^2 - 4(4)(81)}}{2(4)}$$

$$\frac{36 \pm \sqrt{0}}{8}$$

$$\frac{36}{8} = \frac{9}{2} \text{ or } 4.5$$

10.  $2x^2 - 12x + 7 = 5$

$-5 \leftarrow$

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

$a=2 \quad b=-12 \quad c=2$

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

$$\frac{12 \pm \sqrt{128}}{4}$$

$$\frac{12 \pm 8\sqrt{2}}{4}$$

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$$3 \pm 2\sqrt{2}$$

11.  $9x^2 - 6x - 4 = -5$

$+5 \leftarrow$

$9x^2 - 6x + 1 = 0$

$a=9 \quad b=-6 \quad c=1$

$$\frac{-(-6) \pm \sqrt{(-6)^2 - 4(9)(1)}}{2(9)}$$

$$\frac{6 \pm \sqrt{0}}{18}$$

$$\frac{6}{18} = \frac{1}{3}$$

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12.  $2x - 5 = -x^2$

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

$a=1 \quad b=2 \quad c=-5$

$$\frac{-2 \pm \sqrt{(2)^2 - 4(1)(-5)}}{2(1)}$$

$$\frac{-2 \pm \sqrt{24}}{2}$$

$$\frac{-2 \pm 2\sqrt{6}}{2}$$

$$-1 \pm \sqrt{6}$$

$$-1 \pm \sqrt{6}$$