

Math 305

Quadratics

#1 $x^2 - 4x - 12 = 0$
 $(x-6)(x+2) = 0$
 $x = 6$ or -2

#2 $3x^2 - 5x + 8 = 0$
 $(3x-8)(x+1) = 0$
 $x = \frac{8}{3}$ or $x = -1$

#3 $5x^2 - 11x - 7 = 0$ can't factor, use quadratic formula
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
 $a=5$ $b=-11$ $c=-7$
 $x = \frac{11 \pm \sqrt{(-11)^2 - 4(5)(-7)}}{2 \cdot 5}$
 $x = \frac{11 + \sqrt{201}}{10}$ or $\frac{11 - \sqrt{201}}{10}$
 $x = 2.72$ or -0.52

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

- if $b^2 - 4ac = 0$ 1 root
- if $b^2 - 4ac > 0$ 2 roots
- if $b^2 - 4ac < 0$ No real roots

$-5x^2 + 8x - 10 = 0$
 $b^2 - 4ac$
 $8^2 - 4(-5)(-10)$
 $64 - 200$
 $= -136$
No real roots

#2 Find the value of k so that there are 2 real roots

$4x^2 - 5x + k = 0$ \downarrow $b^2 - 4ac > 0$
 $5 > 3$
 $-5 > -3$ false
 $-5 < -3$
 $(-5)^2 - 4(4)k > 0$
 $25 - 16k > 0$
 $-\frac{16}{6}k > -\frac{25}{6}$
 $k < \frac{25}{16}$

Sum of Roots / Product of Roots

$$2x^2 + 5x - 3 = 0 \quad \text{Sum of Roots}$$

$$(2x - 1)(x + 3) = 0$$

$$x = \frac{1}{2} \text{ or } -3 = \frac{1}{2} + -3 = -2\frac{1}{2} \text{ or } \left(\frac{-5}{2}\right)$$

$$\text{Product } \frac{1}{2} \times -3 = \left(\frac{-3}{2}\right)$$

$$7x^2 - 4x + 3 = 0$$

$$\text{Sum} = \frac{+4}{7} \quad \text{product} = \frac{3}{7}$$

$$\text{Sum} = \frac{-b}{a}$$

$$\text{product} = \frac{c}{a}$$

A quadratic equation has roots with a sum of $\frac{7}{4}$ and a product of $\frac{3}{4}$. Find the equation.

$$S = \frac{-b}{a}$$

$$P = \frac{c}{a}$$

$$4x^2 - 7x + 3 = 0$$

A quadratic equation has roots of $\frac{2}{3}$ and $\frac{4}{7}$.

Find its equation.

$$3x^2 - 14x + 8 = 0$$

$$\text{Sum } \frac{2}{3} + \frac{4}{7} = \frac{42}{21} + \frac{12}{21} = \frac{54}{21} = \frac{18}{7}$$

$$\text{product } \frac{2}{3} \cdot \frac{4}{7} = \frac{8}{21}$$

$$a = 3 \quad b = -14 \quad c = 8$$