

Math 6c, homework 26



1. Try to solve the quadratic equations by completing the full square:

Example:

$$x^2 + 5x + 6 = 0$$

$$x^2 + 2 \cdot \frac{1}{2} \cdot 5x + 6 = x^2 + 2 \cdot \left(\frac{1}{2} \cdot 5\right) \cdot x + \left(\frac{1}{2} \cdot 5\right)^2 - \left(\frac{1}{2} \cdot 5\right)^2 + 6 = 0$$

$$\left(x^2 + 2 \cdot \left(\frac{1}{2} \cdot 5\right) \cdot x + \left(\frac{1}{2} \cdot 5\right)^2\right) - \left(\left(\frac{1}{2} \cdot 5\right)^2 - 6\right) = 0$$

$$\left(x + \frac{1}{2} \cdot 5\right)^2 - \left(\left(\frac{1}{2} \cdot 5\right)^2 - 6\right) = \left(x + \frac{5}{2}\right)^2 - \left(\frac{25}{4} - 6\right) = \left(x + \frac{5}{2}\right)^2 - \frac{1}{4} = \left(x + \frac{5}{2}\right)^2 - \left(\frac{1}{2}\right)^2 = 0$$

$$\left(x + \frac{5}{2}\right)^2 - \left(\frac{1}{2}\right)^2 = \left(x + \frac{5}{2} - \frac{1}{2}\right)\left(x + \frac{5}{2} + \frac{1}{2}\right) = (x + 2)(x + 3) = 0$$

$$x + 2 = 0 \quad \text{or} \quad x + 3 = 0$$

$$x = -2 \quad \text{or} \quad x = -3$$

Check:

$$(-2)^2 + 5(-2) + 6 = 0 \quad (-3)^2 + 5(-3) + 6 = 0$$

a. $x^2 + x - 6 = 0$

b. $x^2 + 4x + 4 = 0$

2. Solve the quadratic equations using the formula for the roots of quadratic equations:

For quadratic equation

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

$$x_1 = \frac{-b + \sqrt{D}}{2a} \quad x_2 = \frac{-b - \sqrt{D}}{2a}; \quad \text{where } D = b^2 - 4ac$$

If $D > 0$, equation has two roots, if $D = 0$, equation has only one root, if $D < 0$, equation has no real solutions.

a. $x^2 - 4x - 21 = 0$

b. $x^2 + 9x + 18 = 0$

c. $7y^2 + 9y + 2 = 0$

d. $6x^2 - 13x - 5 = 0$;

e. $x^2 + 2x - 1 = 0$

f. $x^2 + 2x + 3 = 0$;