Ecuatia de gradul II

Forma generala a ecuatiei de gradul al doilea este : a x^2 +b x +c = 0 ;

Calculam delta, $\Delta = b^2 - 4 \cdot a \cdot c$; Solutiile ecuatiei sunt date de formula: $x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2 \cdot a}$

Daca Δ >0, ecuatia are 2 solutii reale diferite.
Daca Δ =0, ecuatia are 2 solutii reale egale.
Daca Δ <0, ecuatia nu are solutii reale.

Ex: 1) Rezolvati ecuatia : $x^2 - 5x - 6 = 0$.
Identificam coeficientii : a = 1, b = -5 , c = -6
Calculam Δ : $\Delta = b^2 - 4 \cdot a \cdot c$ = $(-5)^2 - 4 \cdot 1 \cdot (-6)$ = 25 + 24 = 49

$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2 \cdot a} = \frac{5 \pm \sqrt{49}}{2} = \frac{5 \pm 7}{2}$, deci $x_1 = \frac{5+7}{2}$ = 6, $x_2 = \frac{5-7}{2} = -1$

2) Rezolvati ecuatia : $x^2 + 4x + 5 = 0$

a = 1, b = 4 , c = 5
$\Delta = b^2 - 4 \cdot a \cdot c$ = $4^2 - 4 \cdot 1 \cdot 5$ = 16-20 = -4, deci ecuatia nu are solutii reale. Pentru ca nu exista $\sqrt{-4}$

3) Rezolvati ecuatia : $x^2 - 5x = 0$.
Identificam coeficientii : a = 1, b = -5 , c = 0
Calculam Δ : $\Delta = b^2 - 4 \cdot a \cdot c$ = $(-5)^2 - 4 \cdot 1 \cdot 0 = 25$

$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2 \cdot a} = \frac{5 \pm \sqrt{25}}{2} = \frac{5 \pm 5}{2}$, deci $x_1 = \frac{5+5}{2}$ = 5, $x_2 = \frac{5-5}{2} = 0$

Metoda 2. Dam factor comun pe x si avem : $x \cdot (x-5) = 0 \Rightarrow x = 0$ *sau* $paranteza = 0 \Rightarrow x = 5$

4) Rezolvati ecuatia : $x^2 - 4 = 0$.
Identificam coeficientii : a = 1, b = 0 , c = -4
Calculam Δ : $\Delta = b^2 - 4 \cdot a \cdot c$ = $0^2 - 4 \cdot 1 \cdot (-4) = 16$

$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2 \cdot a} = \frac{0 \pm \sqrt{16}}{2} = \frac{\pm 4}{2}$, deci x_1 = 2, $x_2 = -2$

Metoda 2. Mutam 4 dupa egal, cu semn schimbat si avem : $x^2 = 4 \Rightarrow x = \pm\sqrt{4} \Rightarrow x = \pm 2$

5) Determinati m $\in \mathbb{R}$, astfel incat ecuatia $mx^2 - 3x + 4 = 0$ sa aiba 2 solutii reale distincte.

a = m , b = -3, c = 4.
$\Delta = b^2 - 4 \cdot a \cdot c$ =9-16m.
Ecuatia are 2 solutii reale distincte, daca Δ este >0 , deci 9-16m>0, de unde 9>16m, m< $\frac{9}{16}$.

Tema

Rezolvati ecuatiile :

1) $x^2 - 5x + 6 = 0$.
2) $x^2 - 2x - 3 = 0$
3) $x^2 - 9 = 0$
4) $x^2 + 4 = 0$
5) $x^2 - 6x + 9 = 0$
6) $2x^2 - 5x + 2 = 0$

7) Determinati $m \in \mathbb{R}$, astfel incat ecuatia $x^2 - mx + 4 = 0$ sa aiba 2 solutii reale egale.

8) Aratati ca ecuatia $x^2 - 2x + 1 + m^2 = 0$ nu are solutii reale, pentru orice valori ale lui m, nenule