Foundation

UDAAN 2025

Maths

Quadratic Equations

DHA: 04

Q1 Find the roots of the equation $a^2x^2 - 3abx + 2b^2 = 0$ by the method of completing the square.

(A) $\frac{2b}{a}, \frac{b}{a}$
(B) $-\frac{2b}{a}, \frac{b}{a}$
(C) $-\frac{2b}{a}, -\frac{b}{a}$
(D) $\frac{2b}{a}, -\frac{b}{a}$

Q2 Find the roots of the equation $5x^2 - 6x - 2 = 0$ by the method of completing the square.

(A) $\frac{3+\sqrt{19}}{5}, \frac{3-\sqrt{19}}{5}$
(B) $\frac{3+\sqrt{19}}{2}, \frac{3-\sqrt{19}}{2}$
(C) $\frac{3+\sqrt{19}}{3}, \frac{3-\sqrt{19}}{3}$
(D) $\frac{3+\sqrt{19}}{4}, \frac{3-\sqrt{19}}{4}$

Q3 The number of real roots of the equation $2\left(a^2 + b^2\right)x^2 + 2(a+b)x + 1 = 0, a \neq b$ is

(A) 2
(B) 1
(C) 0
(D) None of these

Q4 If the roots of the equation $(b-c)x^2 + (c-a)x + (a-b) = 0$ are equal, then prove that $2b = a + c$.

Q5 Find the value of k for which the equation $2x^2 + 3x + k$ =0 will have real roots.

Answer Key

Q1 (A)

Q2 (A)

Q3 (C)

Q4 To Prove

Q5 For the given equation to have real roots

D≥ 0

Hints & Solutions

Q1 Text Solution:

$a^2x^2 - 3abx + 2b^2 = 0$

$x^2 - \frac{3bx}{a} + \frac{2b^2}{a^2} = 0$

$x^2 - 2\left(\frac{3b}{2a}\right)x = -\left(\frac{2b^2}{a^2}\right)$

$x^2 + \frac{9b^2}{4a^2} - 2\left(\frac{3b}{2a}\right)x = \frac{9b^2}{4a^2} - \frac{2b^2}{a^2}$

$\left(x - \frac{3b}{2a}\right)^2 = \frac{9b^2 - 8b^2}{4a^2}$

$\left(x - \frac{3b}{2a}\right)^2 = \frac{b^2}{4a^2}$

$\left(x - \frac{3b}{2a}\right) = \pm\frac{b}{2a}$

$x = \frac{2b}{a}, \frac{b}{a}$

Video Solution:

Q2 Text Solution:

$5x^2$ – 6x – 2 = 0 ……………………………… (1)

On multiplying (1) by 5, we get $25x^2$ - 30x -10 = 0

$(5x)^2$ - 2(5x)(3) +9 - 9 – 10 = 0

$(5x - 3)^2$ = 19

Taking square root on both sides, we get

5x – 3 = ±√19

5x = ±√19

5x = 3 + √19 ,5x = 3 - √19

x = (3 + √19)/5 ,x = (3 - √19)/5

Therefore (3 + √19)/5 and (3 - √19)/5 are the roots of the given quadratic equation.

Video Solution:

Q3 Text Solution:

Here,

D=$b^2 - 4ac$

$= 4(a+b)^2 - 4 \times 1 \times 2\left(a^2 + b^2\right)$

$= (a+b)^2 - 2\left(a^2 + b^2\right)$

$= a^2 + b^2 + 2ab - 2a^2 - 2b^2$

$= -(a-b)^2 < 0$

$Hence\ D < 0$

$Hence\ no\ real\ roots$

Since D <0, no real roots exist

Video Solution:

Q4 Text Solution:

If, D=0 , real and equal roots

Here,

$D = (c-a)^2 - 4\left(b-c\right)\left(a-b\right)$

$D = c^2 + a^2 - 2ca - 4\left(ba - b^2 - ca + bc\right)$

$= c^2 + a^2 + 4b^2 + 2ca - 4ba - 4bc$

$= (c + a - 2b)^2$

$As\ D = 0$

$(c + a - 2b)^2 = 0$

$Taking\ square\ root\ on\ both\ sides;$

$\left(c + a - 2b\right) = 0$

$c + a = 2b$

Taking square root on both sides;

Video Solution:

Q5 **Text Solution:**

$D \geq 0$

$b^2 - 4ac \geq 0$

$(3)^2 - 4 \times 2 \times k \geq 0$

$9 - 8k \geq 0$

$k \leq \frac{9}{8}$

Video Solution:

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