Answer on Question # 56573 – Math – Algebra

Find roots using factorisation method

(1):- *1/2 x^2 - root under 11 x + 1 = 0*

(2):- *x^2 + 2 root under 2 x - 6 = 0*

(3):- *a(x^2+1)=(a^2+1)x , a is not equal to 0*

Solution

(1)

$$-\frac{1}{2}x^2 - \sqrt{11}x + 1 = 0$$
$$x^2 + 2\sqrt{11}x - 2 = 0$$
$$x^2 + 2\sqrt{11}x + 11 - 13 = 0$$
$$(x + \sqrt{11})^2 - 13 = 0$$
$$(x + \sqrt{11} - \sqrt{13})(x + \sqrt{11} + \sqrt{13}) = 0$$
$$x = -11 + \sqrt{13}\ and\ x = -11 - \sqrt{13}$$

Answer: $x = -11 \pm \sqrt{13}$

(2)

$$-x^2 + 2\sqrt{2}x - 6 = 0$$
$$x^2 - 2\sqrt{2}x + 6 = 0$$
$$x^2 - 2\sqrt{2}x + 2 + 4 = 0$$
$$(x - \sqrt{2})^2 + 4 = 0$$
$$(x - \sqrt{2})^2 - 4i^2 = 0$$
$$(x - \sqrt{2} - 2i)(x - \sqrt{2} + 2i) = 0$$

Answer: $x = \sqrt{2} \pm 2i$

(3)

$$-a(x^2 + 1) = (a^2 + 1)x$$
$$(a^2 + 1)x + a(x^2 + 1) = 0$$
$$a^2x + x + ax^2 + a = 0$$
$$ax^2 + (a^2 + 1)x + a = 0$$
$$x^2 + (a + \frac{1}{a})x + 1 = 0$$
$$x^2 + \left(a + \frac{1}{a}\right)x + \left(\frac{a}{2} + \frac{1}{2a}\right)^2 - \left(\frac{a}{2} + \frac{1}{2a}\right)^2 + 1 = 0$$
$$\left(x + \frac{a}{2} + \frac{1}{2a}\right)^2 - \left(\frac{a^2}{4} + \frac{1}{2} + \frac{1}{4a^2} - 1\right) = 0$$
$$\left(x + \frac{a}{2} + \frac{1}{2a}\right)^2 - \left(\frac{a^2}{4} - \frac{1}{2} + \frac{1}{4a^2}\right) = 0$$
$$\left(x + \frac{a}{2} + \frac{1}{2a}\right)^2 - \left(\frac{a}{2} - \frac{1}{2a}\right)^2 = 0$$
$$\left(x + \frac{a}{2} + \frac{1}{2a} + \frac{a}{2} - \frac{1}{2a}\right)\left(x + \frac{a}{2} + \frac{1}{2a} - \frac{a}{2} + \frac{1}{2a}\right) = 0$$
$$(x + a)\left(x + \frac{1}{a}\right) = 0$$
$$x = -a\ and\ x = -\frac{1}{a}$$

Answer: $x = -a\ and\ x = -\frac{1}{a}$