**Answer on Question #57269 – Math – Algebra**

**Question**

**1.** Solve the polynomial equation, show work. x^3 – 7x^2 – x + 7 = 0

**Solution**

x^3 – 7x^2 – x + 7 = 0.

The possible roots of the equation are among the divisors of the constant term 7.

So one of the roots is 7.

Check:

$7^3 - 7 \cdot 7^2 - 7 + 7 = 0.$

Find other roots:

$\frac{x^3-7x^2-x+7}{x-7} = x^2 - 1.$

The roots of $x^2 - 1 = 0$ are 1 and -1, because $(-1)^2 - 1 = 0$ and $1^2 - 1 = 0$.

Thus, the roots of x^3 – 7x^2 – x + 7 = 0 are -1, 1, 7.

**Answer:** the roots of x^3 – 7x^2 – x + 7 = 0 are -1, 1, 7.

**Question**

**2.** Solve the polynomial equation, show work. x^4 + x^3 – 6x^2 – 14x – 12 = 0

**Solution**

x^4 + x^3 – 6x^2 – 14x – 12 = 0.

The possible roots of the equation are among the divisors of the constant term -12. One of the roots is -2.

Check:

$$(-2)^4 + (-2)^3 - 6 \cdot (-2)^2 - 14 \cdot (-2) - 12 = 0$$

Find other roots:

$\frac{x^4+x^3-6x^2-14x-12}{x+2} = x^3 - x^2 - 4x - 6$. One of the root of $x^3 - x^2 - 4x - 6 = 0$ is 3, because

$$3^3 - 3^2 - 4 \cdot 3 - 6 = 0$$

Find other roots.

$\frac{x^3-x^2-4x-6}{x-3} = x^2 + 2x + 2$. Solve the quadratic equation:

$D = 2^2 - 4 * 1 * 2 = 4 - 8 = -4, \text{hence } D < 0, \sqrt{D} = \pm 2i.$

$x = \frac{-2 \pm 2i}{2} = -1 \pm i$ .

The roots of x^4 + x^3 – 6x^2 – 14x – 12 = 0 are -2, 3, -1+i, -1-i.

**Answer:** the roots of x^4 + x^3 – 6x^2 – 14x – 12 = 0 are -2, 3, -1+i, -1-i.