

Answer on Question #61370 – Math – Algebra

Question

5) Given

$$f(x) = -x^2 + 6x - 11,$$

find

$$f(4x-1)$$

a) $-16x^2 + 32x - 18$

b) $-8x^2 + 2x - 8$

c) $22 + 6x - 5$

d) $4x^2 + 7x - 9$

Solution

$$f(x) = -x^2 + 6x - 11,$$

$$f(4x - 1) = -(4x - 1)^2 + 6(4x - 1) - 11 = -16x^2 + 32x - 18.$$

Answer: a) $-16x^2 + 32x - 18$.

Question

Determine all the roots

$$f(x) = 9x^2 - 18x + 6$$

a) $x=1, x=5+(\sqrt{5})^3, x=5-(\sqrt{5})^3$

$x=1, x=5+(5)^3, x=5-(5)^3$

b) $x=0, x=1+(\sqrt{2})^2, x=1-(\sqrt{2})^3$

$x=0, x=1+(2)^2, x=1-(2)^3$

c) $x=1, x=2+(\sqrt{2})^2, x=2-(\sqrt{2})^3$

$x=1, x=2+(2)^2, x=2-(2)^3$

d) $x=0, x=3+(\sqrt{3})^3, x=3-(\sqrt{3})^3$

$x=0, x=3+(3)^3, x=3-(3)^3$

Solution

$$f(x) = 9x^3 - 18x^2 + 6x = 0.$$

So

$$3x(3x^2 - 6x + 2) = 0.$$

Hence

$$x = 0 \text{ or } 3x^2 - 6x + 2 = 0.$$

Thus

$$x_1 = 0 \text{ or } x_{2,3} = \frac{6 \pm \sqrt{(-6)^2 - 4 \cdot 3 \cdot 2}}{2 \cdot 3} = \frac{6 \pm \sqrt{36 - 24}}{6} = \frac{6 \pm \sqrt{12}}{6} = \frac{6 \pm 2\sqrt{3}}{6} = \frac{3 \pm \sqrt{3}}{3} = 1 \pm \frac{\sqrt{3}}{3}.$$

Finally

$$x_1 = 0, x_2 = \frac{3 + \sqrt{3}}{3}, x_3 = \frac{3 - \sqrt{3}}{3}.$$

$$\text{Answer: d) } x_1 = 0, x_2 = \frac{3 + \sqrt{3}}{3}, x_3 = \frac{3 - \sqrt{3}}{3}.$$