Answer on Question #42525 – Math - Algebra

Problem

Using the given zero, find one other zero of $f(x)$. i is a zero of $f(x) = x^4 - 2x^3 + 38x^2 - 2x + 37$.

$-1 + i$

$-i$

$-1 - i$

1

Solution

$$x_1 = i$$

Complex zeroes always come in conjugate pairs in the polynomial with real coefficients. So if $a + bi$ is a zero, then $a - bi$ will also be a zero. Now since we are given that i is a zero, we can conclude that $(-i)$ is also a zero. Thus, $x_2 = -i$

We have

$$x^2 = (i)^2$$

$$x^2 = -1$$

$$x^2 + 1 = 0$$

Now there is one of the factors of polynomial. To get other factor divide $f(x)$ by this factor.

$$x^4 - 2x^3 + 38x^2 - 2x + 37 = (x^2 + 1)(x^2 - 2x + 37)$$

To get other zeros, set factor equal to 0

$$x^2 - 2x + 37 = 0$$

$$(x - 1)^2 + 36 = 0$$

$$x_3 = 1 - 6i$$

$$x_4 = 1 + 6i$$

Answer: $x_1 = i$, $x_2 = -i$, $x_3 = 1 - 6i$, $x_4 = 1 + 6i$