

Write Polynomial Given Roots NOTES

Key

Given these roots, write the original polynomial (don't forget that imaginary and complex roots have a conjugate! They come in pairs!) Assume $a=1$

1. Roots are $x = 2$ and $x = -5$

$$(x-2)(x+5)$$

$$x^2 + 5x - 2x - 10$$

$$x^2 + 3x - 10 = 0$$

2. Roots are $x = -6$ and $x = -3$

$$(x+6)(x+3)$$

$$x^2 + 3x + 6x + 18$$

$$x^2 + 9x + 18 = 0$$

3. Roots are $x = 1$, $x = -1$, and $x = 3$

$$(x-1)(x+1)(x-3)$$

$$x^2 + 1x - 1x - 1$$

$$(x^2 - 1)(x-3)$$

$$x^3 - 3x^2 - 1x + 3 = 0$$

4. Root is $(x)^2 = (-5i)^2$

$$x^2 = 25i^2$$

$$x^2 = -25$$

$$x^2 + 25 = 0$$

Given these roots, write the original polynomial (don't forget that imaginary and complex roots have a conjugate! They come in pairs!) Assume $a=1$

5. Roots are $x = 3, x = -2, x = 0, x = 7$

$$(x-3)(x+2)(x-0)(x-7)$$

$$x^2 + 2x - 3x - 6 \quad x(x-7)$$

$$(x^2 - x - 6) \quad (x^2 - 7x)$$

$$x^4 - 7x^3 - x^3 + 7x^2 - 6x^2 + 42x$$

$$x^4 - 8x^3 + x^2 + 42x = 0$$

6. Roots are $x = 2$ and $(x)^2 = (-4i)^2$

$$(x-2) \quad x^2 = 16i^2$$

$$x^2 = -16$$

$$(x^2 + 16)$$

$$(x-2)(x^2 + 16)$$

$$x^3 + 16x - 2x^2 - 32$$

$$x^3 - 2x^2 + 16x - 32 = 0$$

7. Root is $x = 3 + 4i$

$$(x-3)^2 = (\pm 4i)^2$$

$$(x-3)(x-3) = 16i^2$$

$$x^2 - 3x - 3x + 9 = \begin{matrix} -16 \\ +16 \end{matrix}$$

$$x^2 - 6x + 25 = 0$$

8. Roots are $x = -1$ and $x = 2 - 3i$

$$(x+1) \quad (x-2)^2 = (\pm 3i)^2$$

$$(x-2)(x-2) = 9i^2$$

$$x^2 - 2x - 2x + 4 = \begin{matrix} -9 \\ +9 \end{matrix}$$

$$(x+1)(x^2 - 4x + 13)$$

$$x^3 - 4x^2 + 13x + 1x^2 - 4x + 13$$

$$x^3 - 3x^2 + 9x + 13 = 0$$