

Precalculus

§ Factor cubic with rational roots using its plot

Todor Milev

2019

Example

Plot the left hand side of the equation with a graphing calculator. Solve the equation.

$$2x^3 + x^2 - 7x - 6 = 0$$

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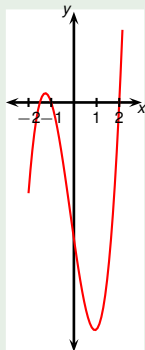


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$$?(x - ?)(x - ?)(x - ?)$$

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$$2(x - (-1.5))(x - (-1))(x - 2) = (2x + 3)(x + 1)(x - 2)$$

Check work to make sure we guessed the roots correctly.

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$$\begin{aligned} 2x^3 + x^2 - 7x - 6 &= 0 \\ (2x + 3)(x + 1)(x - 2) &= 0 \end{aligned}$$

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$$\begin{aligned}
 2x^3 + x^2 - 7x - 6 &= 0 \\
 (2x + 3)(x + 1)(x - 2) &= 0 \\
 x = -\frac{3}{2} \quad \text{or} \quad x = -1 \quad \text{or} \quad x = 2
 \end{aligned}$$

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$$\begin{aligned}
 2(x - (-1.5))(x - (-1))(x - 2) &= (2x + 3)(x + 1)(x - 2) \\
 &= (2x^2 + 5x + 3)(x - 2) = (2x^3 + 5x^2 + 3x) - (4x^2 + 10x + 6) \\
 &= 2x^3 + x^2 - 7x - 6
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