

Precalculus

Factor cubic with rational roots using its plot

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Example



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

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

Make sure to practice with the graphing calculator you will on your exam(s). The graph appears to intersect the x axis at: $-1.5, -1, 2$. The left hand side should factor as:

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

Check work to make sure we guessed the roots correctly.