Long Division of Polynomials - Example 2

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Example 2: Simplify $\dfrac{x^3 - x^2 - 2x + 2}{x - 1}$

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$$x - 1 \overline{)\quad x^3 - x^2 - 2x + 2}$$

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First we divide the lead terms: $\frac{x^3}{x} = x^2$

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First we divide the lead terms: $\frac{x^3}{x} = x^2$

Next we multiply $x^2 \cdot (x - 1)$ and subtract

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\multicolumn{1}{r}{x^2} \\
\cline{2-2}
x - 1 \;\big)\; x^3 - x^2 - 2x + 2 \\
\multicolumn{1}{r}{-x^3 + x^2} \\
\cline{2-2}
\multicolumn{1}{r}{-2x + 2}
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First we divide the lead terms: $\frac{x^3}{x} = x^2$

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Now we have a lower degree

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Dividing the new lead terms: $\frac{-2x}{x} = -2$

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Next we multiply $x^2 \cdot (x - 1)$ and subtract

Now we have a lower degree

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Dividing the new lead terms: $\frac{-2x}{x} = -2$

The remainder is 0 because $x = 1$ is a root of $x^3 - x^2 - 2x + 2$

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Conclusion: $\dfrac{x^3 - x^2 - 2x + 2}{x - 1} = x^2 - 2$

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The remainder is 0 because $x = 1$ is a root of $x^3 - x^2 - 2x + 2$

Conclusion: $\dfrac{x^3 - x^2 - 2x + 2}{x - 1} = x^2 - 2$

Alternatively: $x^3 - x^2 - 2x + 2 = (x - 1) \cdot (x^2 - 2)$