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$$\frac{P(x)}{D(x)} = Q(x) + \frac{R(x)}{D(x)}$$

Where the $degree(R) < degree(D)$

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So, if $\frac{P(x)}{D(x)}$ is $Q(x)$ with a remainder of $R(x)$ then:

$$P(x) = D(x) \cdot Q(x) + R(x)$$

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$$
\begin{array}{r|rrrr}
 & & & 2x & -3 \\
\hline
x^2 - 2 & 2x^3 & -3x^2 & +5x & +1 \\
 & -2x^3 & & +4x & \\
\hline
 & & -3x^2 & +9x & +1 \\
 & & 3x^2 & & -6 \\
\hline
 & & & 9x & -5
\end{array}
$$

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In Example 1 we computed $\dfrac{2x^3 - 3x^2 + 5x + 1}{x^2 - 2}$

$$
\begin{array}{r|l}
 & 2x - 3 \\
x^2 - 2 & 2x^3 - 3x^2 + 5x + 1 \\
 & \underline{-2x^3 + 4x } \\
 & - 3x^2 + 9x + 1 \\
 & \underline{3x^2 - 6} \\
 & 9x - 5
\end{array}
$$

From this we drew the conclusion:

$$\frac{2x^3 - 3x^2 + 5x + 1}{x^2 - 2} = 2x - 3 + \frac{9x - 5}{x^2 - 2}$$

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 & \qquad\ \ \underline{3x^2 \qquad\quad - 6} \\
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\begin{array}{r|l}
 & \phantom{2x^3 - 3x^2 + {}} 2x - 3 \\
\hline
x^2 - 2 & 2x^3 - 3x^2 + 5x + 1 \\
 & -2x^3 \phantom{{}-3x^2} + 4x \\
\hline
 & - 3x^2 + 9x + 1 \\
 & \phantom{2x^3 - {}} 3x^2 \phantom{{}+9x} - 6 \\
\hline
 & \phantom{2x^3 - 3x^2 + {}} 9x - 5
\end{array}
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From this we drew the conclusion:

$$\frac{2x^3 - 3x^2 + 5x + 1}{x^2 - 2} = 2x - 3 + \frac{9x - 5}{x^2 - 2}$$

Multiplying by $x^2 - 2$ on both sides gives our alternate conclusion:

$$2x^3 - 3x^2 + 5x + 1 = (2x - 3) \cdot (x^2 - 2) + 9x - 5$$