

11. Find the remainder when $x^6 - 3x^5 + x^3 - x + 12$ is divided by $x^3 - x^2 + x - 1$.

$$\begin{array}{r}
 x^6 - 3x^5 + 0x^4 + x^3 + 0x^2 - x + 12 \quad | \quad x^3 - x^2 + x - 1 \\
 x^6 - x^5 + x^4 - x^3 \quad | \quad x^3 - 2x^2 - 3x + 1 \\
 \hline
 -2x^5 - x^4 + 2x^3 + 0x^2 - x + 11 \\
 -2x^5 + 2x^4 - 2x^3 + 2x^2 \\
 \hline
 -3x^4 + 4x^3 - 2x^2 - x + 11 \\
 -3x^4 + 3x^3 - 3x^2 + 3x \\
 \hline
 x^3 + x^2 - 4x + 11 \\
 x^3 - x^2 + x - 1 \\
 \hline
 2x^2 - 5x + 12 \\
 2x^2 - 5x + 13
 \end{array}$$