Polynomial division

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. Divide $x^3 - 6x^2 + 11x - 6$ by $x - 1$. [2 marks]

Synthetic coefficients at 1 are $1, -5, 6, 0$.

Answer: $Q = x^2 - 5x + 6$, $R = 0$.

2. Divide $2x^3 - 5x^2 + 4x - 3$ by $x - 2$. [2 marks]

Synthetic coefficients at 2 are $2, -1, 2, 1$.

Answer: $Q = 2x^2 - x + 2$, $R = 1$.

3. Divide $x^4 - 16$ by $x^2 + 4$. [2 marks]

Use the difference of squares: $(x^2 - 4)(x^2 + 4) = x^4 - 16$.

Answer: $Q = x^2 - 4$, $R = 0$.

4. Divide $x^3 - 2x + 1$ by $x + 1$. [2 marks]

Include the missing x^2 coefficient: divide coefficients $1, 0, -2, 1$ using -1.

Answer: $Q = x^2 - x - 1$, $R = 2$.

5. Divide $3x^2 + x - 2$ by $3x - 2$. [2 marks]

The leading term is x; the remaining term after subtraction is $3x - 2$.

Answer: $Q = x + 1$, $R = 0$.

6. A student writes $x^3 + 1 = (x + 1)(x^2 - x) + 1$. Check the claim and correct the division. [3 marks]

The claimed product plus remainder is $x^3 - x + 1$, not $x^3 + 1$. Adding 1 to the quotient repairs the identity.

Answer: The correct quotient is $x^2 - x + 1$, remainder 0.