Remainder theorem

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Find the remainder when $x^4 - 3x^2 + 2x + 1$ is divided by $x - 2$. [2 marks]

$P(2) = 16 - 12 + 4 + 1 = 9$.

Answer: 9

2. Find the remainder when $2x^3 + x^2 - 5$ is divided by $x + 2$. [2 marks]

$P(-2) = -16 + 4 - 5 = -17$.

Answer: -17

3. Find the remainder when $4x^3 - 2x + 3$ is divided by $2x + 1$. [2 marks]

At $x = -\frac{1}{2}$, the value is $-\frac{1}{2} + 1 + 3 = \frac{7}{2}$.

Answer: $\frac{7}{2}$

4. $P(x) = x^3 + kx + 2$ has remainder 8 on division by $x - 2$. Find k. [2 marks]

$8 + 2k + 2 = 8$, so $2k = -2$.

Answer: $k = -1$

5. $P(1) = 4$ and $P(-1) = 2$. Find the remainder on dividing P by $x^2 - 1$. [3 marks]

Write $R = mx + c$. Then $m + c = 4$ and $-m + c = 2$, so $m = 1, c = 3$.

Answer: $x + 3$

6. $P(x)$ has remainder 3 when divided by $x - 2$. What remainder does $P(x) + 5(x - 2)^2 - 1$ have on division by $x - 2$? [3 marks]

At $x = 2$, the added square is zero, so the new value is $3 - 1 = 2$.

Answer: 2