Cubic factors and roots

6 questions | 16 marks

Equivalent correct methods earn the corresponding marks.

1. Show x-2 divides $x^3 - 4x^2 + x + 6$. [2 marks]

Substitute: 8-16+2+6=0.

Answer: f(2)=0.

2. Divide $x^3 - 4x^2 + x + 6$ by x-2. [3 marks]

Divide term by term.

Expand $(x-2)(x^2-2x-3)$ to check.

Answer: $x^2 - 2x - 3$

3. Solve $x^3 - 4x^2 + x + 6 = 0$. [3 marks]

Use $(x-2)(x^2-2x-3)$.

Factor the quotient as $(x-3)(x+1)$.

Answer: $x = -1, 2, 3$

4. Find k when x+2 divides $x^3 + kx + 6$. [2 marks]

Set f(-2)=-8-2k+6=0.

Solve -2k=2.

Answer: $k = -1$

5. Factorise $x^3 + 2x^2 - 9x - 18$. [3 marks]

Group $x^2(x+2) - 9(x+2)$.

Factor difference of squares.

Answer: $(x+2)(x-3)(x+3)$

6. Solve $x^3 - 3x + 2 = 0$, stating repeated roots. [3 marks]

Test x=1 and divide to obtain $x^2 + x - 2$.

The factorisation is $(x+2)(x-1)^2$.

Answer: $x = -2$; x=1 repeated.