Factor theorem

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Show that $x-1$ is a factor of x^3-4x+3. [2 marks]

$P(1)=1-4+3=0$.

Answer: It is a factor.

2. Find k if $x+2$ is a factor of x^3+kx+2. [2 marks]

$P(-2)=-8-2k+2=0$, so $k=-3$.

Answer: $k=-3$

3. Find k if $2x-1$ is a factor of $4x^3+kx-1$. [2 marks]

$P(\frac{1}{2})=\frac{1}{2}+\frac{k}{2}-1=0$.

Answer: $k=1$

4. Factor x^3-4x^2-x+4 completely. [2 marks]

Group: $x^2(x-4)-(x-4)=(x-4)(x^2-1)$.

Answer: $(x-4)(x-1)(x+1)$

5. Show that $x+1$ is a repeated factor of x^3+x^2-x-1. [2 marks]

Grouping gives $(x+1)(x^2-1)$, and $x^2-1=(x+1)(x-1)$.

Answer: $P=(x+1)^2(x-1)$.

6. $P(x)=x^3+ax+b$ has factors $x-1$ and $x+2$. Find a, b and the third linear factor. [4 marks]

$1+a+b=0$ and $-8-2a+b=0$. Solving gives $a=-3, b=2$; $P=(x-1)^2(x+2)$.

Answer: $a=-3, b=2$; third factor $x-1$.