Domain and range

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. State the real domain of $f(x)=\frac{5}{x+3}$. [2 marks]

Exclude the input that makes $x+3$ zero.

Answer: $x\in\mathbb{R},\ x\neq -3$.

2. State the real domain of $g(x)=\sqrt{7-2x}$. [2 marks]

Require $7-2x\geq 0$, then solve the inequality.

Answer: $x\leq\frac{7}{2}$.

3. Find the range of $p(x)=-(x+2)^2+9$ for all real x. [2 marks]

A square is non-negative; its negative is non-positive. Equality occurs at $x=-2$.

Answer: $p(x)\leq 9$.

4. Find the range of $q(x)=3x-1$ on $2\leq x\leq 5$. [2 marks]

The function increases; $q(2)=5$ and $q(5)=14$.

Answer: $5\leq q(x)\leq 14$.

5. Simplify $\frac{x^2-9}{x-3}$ and retain its original domain restriction. [2 marks]

Factor the numerator as $(x-3)(x+3)$.

Cancellation is valid only when $x-3$ is non-zero.

Answer: $x+3$, with $x\neq 3$.

6. A square has perimeter $P=4s$. State a sensible domain and range when side length s is measured in centimetres. [2 marks]

A non-degenerate square has positive side length, and multiplying by 4 preserves positivity.

Answer: $s>0$ and $P>0$.