Composition, inverses and parameter equations

Learn and practise | Free preview

A sample from this topic. The complete topic collection contains three different resources and worked solutions.

Read the worked example, then show each step in the practice questions. Attempt the reasoning and exact calculations by hand. Technology may check a result but cannot replace the written argument.

What you will practise

• Composition and inverse functions; equations and parameter systems

Useful starting skills: Mathematical Methods Units 1–2 functions, algebra, probability and introductory calculus.

The composition $f \circ g$ applies g first. Under the study-design convention it is defined when the range of g lies within the domain of f; restrictions can be needed.

Inverse functions exchange domain and range. For parameter equations, separate exceptional values before dividing, and classify unique, no or infinitely many solutions when appropriate.

Worked example

$f(x)=\sqrt{x}$ for $x \geq 0$ and $g(x)=x+3$ for $x \geq -3$. Find $(f \circ g)(x)$ and domain.

g’s range is $[0, \infty)$, contained in f’s domain.

Answer: $\sqrt{(x+3)}$, $x \geq -3$.

Try it yourself

Name: _____ Date: _____

1. $f(x)=2x-1$, $g(x)=x^2$. Find $f(g(x))$ and $g(f(x))$.

2. Find inverse of $f(x)=\ln(x-2)$, $x>2$.

Answers and explanations

Check the method as well as the final answer. An alternative correct method is also valid.

1. $2x^2-1$; $(2x-1)^2$.

The order of substitution matters.

2. $f^{(-1)}(x)=e^x+2$, all real x.

Exponentiate $y=\ln(x-2)$ and solve for x.

Curriculum reference: Mathematical Methods Units 3–4 — Composition and inverse functions; equations and parameter systems

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