A Level Maths

Topic: Composite and Inverse Functions

Instructions

Answer all questions. Show complete working. Use composite and inverse functions where appropriate.

Practice Questions

1. Given $f(x) = 2x + 3$ and $g(x) = x^2 - 1$, find:
   (i) $(f \circ g)(x)$
   (ii) $(g \circ f)(x)$
2. If $f(x) = x^3$ and $g(x) = \sqrt{x}$, find:
   (i) $(f \circ g)(x)$
   (ii) $(g \circ f)(x)$
3. Given $f(x) = 3x - 4$ and $g(x) = \frac{1}{x}$, find:
   (i) $(f \circ g)(x)$
   (ii) $(g \circ f)(x)$
4. Find the inverse of the function $f(x) = 2x - 5$.
5. If $f(x) = 4x + 1$, find $f^{-1}(x)$.
6. Given $f(x) = \dfrac{2x + 3}{x - 1}$, find $f^{-1}(x)$.
7. Find the inverse of $g(x) = x^2 + 3$ for $x \geq 0$.
8. For the function $f(x) = 2x + 3$, find $(f \circ f)(x)$ and verify that $f^{-1}(x)$ is the inverse function of $f(x)$.

Multiple-Choice Questions

1. If $f(x) = x + 2$ and $g(x) = 3x$, what is $(f \circ g)(x)$?

   A. $3x + 2$

   B. $3x - 2$

   C. $2x + 3$

   D. $2x - 3$

2. The inverse of the function $f(x) = 3x + 5$ is:

   A. $f^{-1}(x) = \frac{x-5}{3}$

   B. $f^{-1}(x) = \frac{x+5}{3}$

   C. $f^{-1}(x) = \frac{3x-5}{1}$

   D. $f^{-1}(x) = x - 5$

3. If $f(x) = x^2 - 2x + 5$, what is $(f \circ f)(x)$?

   A. $x^4 - 4x^3 + 10x^2 - 10x + 5$

   B. $x^2 - 2x + 5$

   C. $x^2 - 4x + 10$

   D. $x^4 - 4x^3 + 10x^2 - 5x + 5$

4. If $f(x) = 3x - 4$, what is $f^{-1}(x)$?

   A. $\frac{x+4}{3}$

   B. $\frac{x-4}{3}$

   C. $3x + 4$

   D. $\frac{3x-4}{1}$

5. If $f(x) = 2x - 1$, the inverse function $f^{-1}(x)$ is:

   A. $\frac{x-1}{2}$

   B. $\frac{x+1}{2}$

   C. $x + 1$

   D. $2x + 1$