

Function Composition and Inverses: math test, Grade 12 – download the PDF

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1 Compositions

/ 4 pts

Let $f(x) = x^2 - 4x$ and $g(x) = 3x + 1$.

- Find $(f \circ g)(x)$ and simplify.
- Find $(g \circ f)(x)$.
- Compute $(f \circ g)(1)$.
- Solve $(f \circ g)(x) = 0$.

2 Domains of composites

/ 3 pts

Let $f(x) = \sqrt{x-1}$ and $g(x) = 6 - x^2$. Find $f \circ g$ and $g \circ f$ and the domain of each.

3 A rational inverse

/ 4 pts

Let $f(x) = \frac{2x+5}{x-1}$ for $x \neq 1$.

- Find $f^{-1}(x)$.
- Verify that $f(f^{-1}(x)) = x$.
- State the domain and the range of f .

4 A restricted inverse

/ 3 pts

Let $f(x) = x^2 - 6x + 4$ for $x \geq 3$. Find f^{-1} and its domain, then verify with $f^{-1}(11)$.

5 Transforming a root graph

/ 3 pts

Let $g(x) = 2\sqrt{x+3} - 4$.

- Describe the transformations of $y = \sqrt{x}$ that give g , and state the domain and range.
- Find the x-intercept and the y-intercept (exact value, then a decimal rounded to the hundredth; a calculator is allowed).

6 Symmetry and pieces

/ 3 pts

- Classify $f(x) = x^5 + 3x$, $g(x) = x^4 - |x|$ and $h(x) = x^2 + 2x + 1$ as even, odd, or neither.
- Rewrite $k(x) = |x-1| + x$ as a piecewise function.



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