

Functions and Transformations: math test, Grade 11 – download the PDF

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

1 Notation and domains

/ 3 pts

Calculator not allowed.

- If $f(x) = 2x^2 - x + 3$, compute $f(-2)$.
- Find the domain of $h(x) = \sqrt{2x - 7}$.
- Find the domain of $k(x) = \frac{x + 1}{x^2 - 16}$.

2 Transformations

/ 4 pts

Let $g(x) = -3|x + 2| + 5$.

- Describe how the graph of $y = |x|$ is transformed into the graph of g .
- Give the vertex of g .
- Give the range of g .
- Compute $g(1)$.

3 Combining functions

/ 3 pts

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

- Find $(f + g)(x)$.
- Compute $(fg)(2)$.
- Give the domain of $\frac{g}{f}$ and justify.

4 Composition

/ 4 pts

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

- Find $f(g(x))$.
- Find $g(f(x))$.
- Compute $f(g(-2))$.
- Solve $f(g(x)) = 47$.

5 Inverse functions

/ 4 pts

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

- Find $f^{-1}(x)$.
- Compute $f^{-1}(-4)$ and check it with f .
- Show that $f(f^{-1}(x)) = x$.

6 Shipping cost

/ 2 pts

A shop charges \$6 to ship a package of at most 2 pounds, and \$2.50 more per additional pound (prorated) beyond 2 pounds: $S(w) = 6$ if $0 < w \leq 2$, and $S(w) = 6 + 2.5(w - 2)$ if $w > 2$. Compute $S(1.2)$ and $S(6)$.



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