

Math 22 Section 9

Quiz 6 Solutions

1. Express the quadratic $f(x) = 3x^2 + 6x + 4$ in standard form and find its vertex. Indicate whether the graph of $f(x)$ opens upwards or downwards.

$$f(x) = 3(x^2 + 2x) + 4 = 3(x^2 + 2x + 1) - 3 + 4 = 3(x + 1)^2 + 1$$

$$(h, k) = (-1, 1)$$

$a = 3 > 0$ so $f(x)$ opens upwards

2. (2 points) What is the extreme value of $f(x) = 3x^2 + 6x + 4$? Is it a maximum or a minimum?

From 1, the vertex is $(-1, 1)$ so the extreme value is 1. Since $f(x)$ opens upwards, this is a minimum.

3. (2 points) Let $f(x) = \sqrt{x}$ and $g(x) = x + 3$. Find $(f \circ g)(x)$ and its domain.

$$(f \circ g)(x) = f(g(x)) = \sqrt{x + 3}$$

The domain is $\{x \mid x \geq -3\}$

4. (2 points) Let $f(x) = \frac{x^5-3}{2}$. Find $f^{-1}(x)$.

$$y = f(x) = \frac{x^5-3}{2}$$

$$2y = x^5 - 3$$

$$2y + 3 = x^5$$

$$x = (2y + 3)^{\frac{1}{5}}$$

Switching x and y, we get $f^{-1}(x) = (2x + 3)^{\frac{1}{5}}$

5. (1 point) Which of the following functions is not one-to-one?

(a) $f(x) = x^2 + 3x + 2$

(b) $f(x) = 3x + 2$

(c) $f(x) = x^3 + 2$

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