

1. [1 point] What is the domain of the function $f(x) = \sqrt{4 - x^2}$?

- (A) $x \geq 2$ (B) $-2 \leq x \leq 2$ (C) $x \leq -2$
(D) $x < 2$ (E) all x (F) $x \leq -2$ or $x \geq 2$

2. [1 point] Find a formula for the inverse of $f(x) = \ln(x + 6)$.

- (A) e^{x+6} (B) $e^x + 6$ (C) $e^x - 6$
(D) $x + 6$ (E) e^{x-6} (F) $6 - e^x$

3. [1 point] What is the equation of the tangent line to the curve $y = f(x) = 2x + 3x^2$ at the point $(1, 5)$?

- (A) $y = 32x - 27$ (B) $y = 6x - 1$ (C) $y = 8x - 3$
(D) $y = 3x + 2$ (E) $y = 2x + 3$ (F) $y = 2x + 3x^2$

4. [1 point] If a function $f(x)$ is continuous at $x = a$, then it must be differentiable there.

- (A) TRUE (B) FALSE

5. [1 point] What is $\lim_{x \rightarrow \infty} \frac{5x^3 + 7x^2 - 8x + 9}{11x^2 + 7x - 6}$?

- (A) $3/2$ (B) 0 (C) ∞ (D) $-\infty$ (E) $5/11$ (F) $11/5$

6. [2 points] Find the limit $\lim_{x \rightarrow 2} \frac{\sqrt{x^2 + 12} - 4}{x - 2}$. You must do this properly, showing all steps.

7. [3 points] Use the definition of the derivative to find $f'(x)$ if $f(x) = \frac{2x^2}{x + 3}$. Then verify your answer with the Quotient Rule.

8. [5 points] Find the first derivatives of the following functions.

(a) $f(x) = e^{-3x} \sin(4x^2)$

(b) $g(t) = \sqrt{3t^2 + 7t - 2}$

(c) $u(\theta) = \tan^2(3e^\theta)$

(d) $p(t) = 5^{\sqrt{t}}$

(e) $y = e^{x \cos(2x)}$