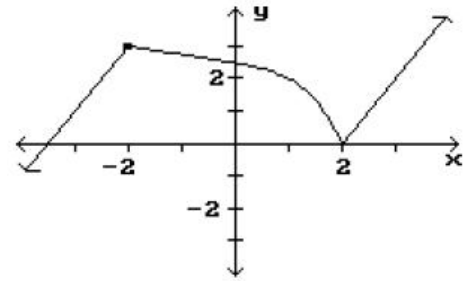


Calculus Test: 2.1 to 3.1. No Calculator

Part I: Multiple Choice



_____ 1. Find the location and value of all relative extrema of the graph shown at right.

- (A) Relative maximum of 3 at -2 ; Relative minimum of 0 at 2
 (B) Relative maximum of 3 at -2 . (C) Relative minimum of 0 at 2
 (D) Relative maximum of -2 at 3; Relative minimum of 2 at 0. (E) None

_____ 2. The critical values of $f(x) = xe^{-x}$ are:

- (A) $x = -1$ (B) $x = 1$ (C) $x = 1, x = -1$ (D) $x = 0, x = 1$ (E) No critical values

_____ 3. Find the global max and min of $f(x) = x^3 - 3x + 1$ on the interval $[0, 2]$.

- (A) Global max at $x = 0$; Global min at $x = 1$ (B) Global max at $x = 2$; Global min at $x = 0$
 (C) Global max at $x = 2, x = -1$; Global min at $x = 1$ (D) Global max at $x = 1$; Global min at $x = 1$
 (E) Global max at $x = 2$; Global min at $x = 1$

_____ 4. If $f(x) = \ln(x + 4 + e^{-3x})$, then $f'(0) =$

- (A) $-\frac{2}{5}$ (B) $\frac{1}{5}$ (C) $\frac{1}{4}$ (D) $\frac{2}{5}$ (E) nonexistent

_____ 5. What is the slope of the line tangent to the curve $y = \arctan(4x)$ at the point at which $x = \frac{1}{4}$?

- (A) 2 (B) $\frac{1}{2}$ (C) 0 (D) $-\frac{1}{2}$ (E) -2

_____ 6. What is the slope of the line tangent to the curve $3y^2 - 2x^2 = 6 - 2xy$ at the point $(3, 2)$?

- (A) 0 (B) $\frac{4}{9}$ (C) $\frac{7}{9}$ (D) $\frac{6}{7}$ (E) $\frac{5}{3}$

_____ 7. Let f be the function defined by $f(x) = x^3 + x$. If $g(x) = f^{-1}(x)$ and $g(2) = 1$, what is the value of $g'(2)$?

- (A) $\frac{1}{13}$ (B) $\frac{1}{4}$ (C) $\frac{7}{4}$ (D) 4 (E) 13

_____ 8. If $f(x) = x^2 + 2x$, then $\frac{d}{dx}[f(\ln x)] =$

- (A) $\frac{2 \ln x + 2}{x}$ (B) $2x \ln x + 2$ (C) $2 \ln x + 2$ (D) $2 \ln x + \frac{2}{x}$ (E) $\frac{2x + 2}{x}$

_____ 9. If $y = x^2 \sin(2x)$, then $\frac{dy}{dx} =$

- (A) $2x \cos(2x)$ (B) $4x \cos(2x)$ (C) $2x[\sin(2x) + \cos(2x)]$
 (D) $2x[\sin(2x) - x \cos(2x)]$ (E) $2x[\sin(2x) + x \cos(2x)]$

Part II: AB Free Response:

10. (1992 AB4/BC1) Consider the curve defined by the equation $y + \cos y = x + 1$ for $0 \leq y \leq 2\pi$.

- (a) Find $\frac{dy}{dx}$ in terms of y .
- (b) Write an equation for each vertical tangent to the curve.
- (c) Find $\frac{d^2y}{dx^2}$ in terms of y .
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BONUS MULTIPLE CHOICE QUESTIONS

_____ 11. The value of the derivative of $y = \frac{\sqrt[3]{x^2 + 8}}{\sqrt[4]{2x + 1}}$ at $x = 0$ is

- (A) -1 (B) $-\frac{1}{2}$ (C) 0 (D) $\frac{1}{2}$ (E) 1

_____ 12. $\frac{d}{dx} \left[x e^{\ln x^2} \right] =$ (A) $1 + 2x$ (B) $x + x^2$ (C) $3x^2$ (D) x^3 (E) $x^2 + x^3$