

Name: _____ Date: _____

AP CALCULUS AB
Unit 3A Review
Derivatives

No calculator may be used to solve the following problems.

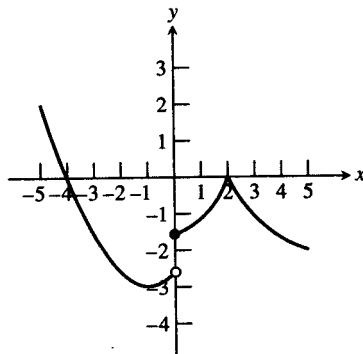
1. If $g(x) = \frac{1}{32}x^4 - 5x^2$, find $g'(4)$.

- (A) -72 (B) -32 (C) -24 (D) 24 (E) 32

2. A particle moves along the x -axis so that at any time $t \geq 0$ its position is given by $x(t) = t^3 - 3t^2 - 9t + 1$. For what values of t is the particle at rest?

- (A) No values (B) 1 only (C) 3 only (D) 5 only (E) 1 and 3

3. The graph of the function f shown in the figure has a horizontal tangent at the point $(-1, -3)$ and a cusp at $(2, 0)$. For what values of x , $-5 < x < 5$, is f not differentiable?



- (A) 0 only (B) 0 and 2 only (C) -1 and 0 only
(D) -1, 0, and 2 (E) -1 and 2 only

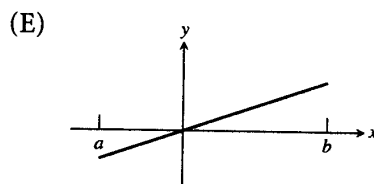
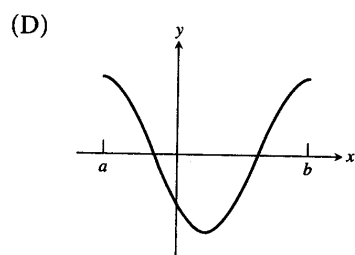
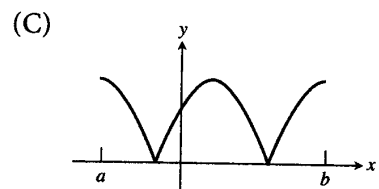
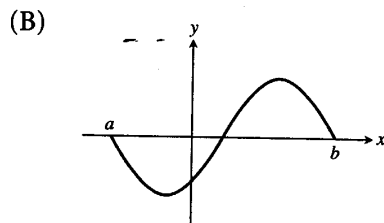
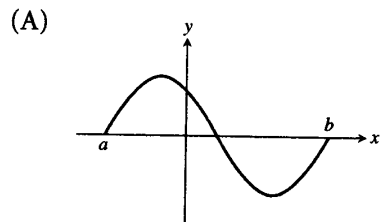
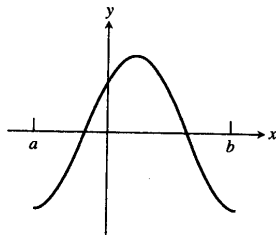
4. If $y = \frac{2x+3}{3x+2}$, then $\frac{dy}{dx} =$

- (A) $\frac{12x+13}{(3x+2)^2}$ (B) $\frac{12x-13}{(3x+2)^2}$ (C) $\frac{5}{(3x+2)^2}$ (D) $\frac{-5}{(3x+2)^2}$ (E) $\frac{2}{3}$

5. What is the instantaneous rate of change at $t = -1$ of the function f if $f(t) = \frac{t^3 + t}{4t + 1}$?

- (A) $\frac{12}{9}$ (B) $\frac{4}{9}$ (C) $-\frac{20}{9}$ (D) $-\frac{4}{9}$ (E) $-\frac{12}{9}$

6. The graph of f is shown in the figure below. Which of the following could be the graph of the derivative of f ?



7. Let $f(x) = \lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$. For what value of x does $f(x) = 4$?

- (A) -2 (B) -1 (C) 1 (D) 2 (E) 4

A graphing calculator may be used for the following problems.

8. Let f be the function given by $f(x) = 3^x$. For what value of x is the slope of the line tangent to the curve at $(x, f(x))$ equal to 1?

- (A) 1.099 (B) 0.086 (C) 0 (D) -0.086 (E) -1.099

9. An equation of the line tangent to the graph of $y = 3x - \cos x$ at $x = 0$ is

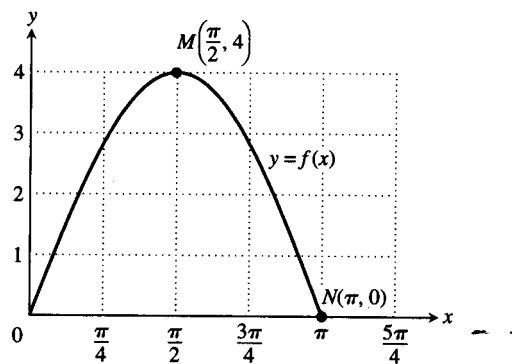
- (A) $y = 2x$ (B) $y = 2x - 1$ (C) $y = 3x + 1$ (D) $y = 3x - 1$ (E) $y = 4x$

10. Which of the following is an equation of the line tangent to the graph of $f(x) = x^6 - x^4$ at the point where $f'(x) = -1$?

- (A) $y = -x - 1.031$
- (B) $y = -x - 0.836$
- (C) $y = -x + 0.836$
- (D) $y = -x + 0.934$
- (E) $y = -x + 1.031$

FREE RESPONSE – No calculator is allowed

11. Let f be the function given by $f(x) = 4 \sin x$. As shown, the graph of f passes through the point $M(\pi/2, 4)$ and crosses the x -axis at point $N(\pi, 0)$.



- (A) Write an equation for the line passing through points M and N .

- (B) Write an equation for the line tangent to the graph of f at point N . Show the analysis that leads to your equation.