

Name _____

Derivatives-Product/Quotient/Trig
(no calculator)

1. Find $f'(x)$ if $f(x) = \left(\frac{4x^3 - 3x^2}{5x^7 + 1} \right)$.

2. Find $\frac{dy}{dx}$ if $y = (\tan x)(\sec x)$.

3. $f(x) = 4x \cot x - \csc x$, find $f'(x)$

4. Find $\frac{dr}{d\theta}$ if $r = \frac{\sec \theta}{1 + \cos \theta}$.

5. $y = (8x - 4)(2x^{-2} + x^{-4})$, find $\frac{dy}{dx}$

6. $\frac{1}{2}(x^{12} + 17) = y$, find $\frac{dy}{dx}$

7. $f(x) = x^2 \sin x$, find $f'(x)$

8. Find $f'(x)$ if $f(x) = \left(\frac{3x^2}{2x - x^3} \right)$

9. Let f be the function defined by $f(x) = 4x^3 - 5x + 3$. Which of the following is an equation of the line tangent to the graph of f at the point where $x = -1$?

- (A) $y = 7x - 3$ (B) $y = 7x + 7$ (C) $y = 7x + 11$ (D) $y = -5x - 1$ (E) $y = -5x - 5$

10. Let f be the function given above. Which of the following statements are true about f ?

- I. $\lim_{x \rightarrow 3} f(x)$ exists.
- II. f is continuous at $x = 3$.
- III. f is differentiable at $x = 3$.

(A) None (B) I only (C) II only (D) I and II only (E) I, II and III

11. Let f and g be differentiable functions with the following properties:

- (i) $g(x) > 0$ for all x
- (ii) $f(0) = 1$

If $h(x) = f(x)g(x)$ and $h'(x) = f(x)g'(x)$, then $f(x) =$

(A) $f'(x)$ (B) $g(x)$ (C) e^x (D) 0 (E) 1

12. What is the instantaneous rate of change at $x = 2$ of the function f given by $f(x) = \frac{x^2 - 2}{x - 1}$?

(A) -2 (B) $\frac{1}{6}$ (C) $\frac{1}{2}$ (D) 2 (E) 6

13. An equation of the line tangent to the graph of $y = x + \cos x$ at the point $(0, 1)$ is

(A) $y = 2x + 1$ (B) $y = x + 1$ (C) $y = x$ (D) $y = x - 1$ (E) $y = 0$

14. An equation of the line tangent to the graph of $y = \frac{2x + 3}{3x - 2}$ at the point $(1, 5)$ is

(A) $13x - y = 8$ (B) $13x + y = 18$ (C) $x - 13y = 64$ (D) $x + 13y = 66$ (E) $-2x + 3y = 13$

15. If $y = \tan x - \cot x$, then $\frac{dy}{dx} =$

(A) $\sec x \csc x$ (B) $\sec x - \csc x$ (C) $\sec x + \csc x$ (D) $\sec^2 x - \csc^2 x$ (E) $\sec^2 x + \csc^2 x$

16. If $f(x) = x$, then $f'(5) =$

(A) 0 (B) $\frac{1}{5}$ (C) 1 (D) 5 (E) $\frac{25}{2}$

non-calculator

Product/Quotient Rule
Multiple Choice Questions

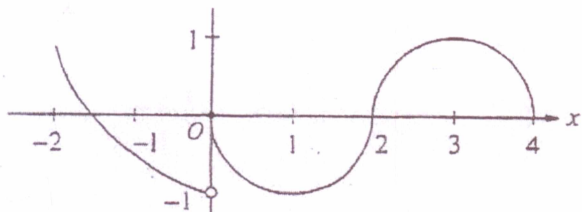
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4. If $y = \frac{2x+3}{3x+2}$, then $\frac{dy}{dx} =$

- (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) $\frac{2}{3}$

7. An equation of the line tangent to the graph of $y = \frac{2x+3}{3x-2}$ at the point (1, 5) is

- (A) $13x - y = 8$ (B) $13x + y = 18$ (C) $x - 13y = 64$
(D) $x + 13y = 66$ (E) $-2x + 3y = 13$



1. (1) The graph of the function f shown in the figure above has a vertical tangent at the point (2, 0) and horizontal tangents at the points (1, -1) and (3, 1). For what values of x , $-2 < x < 4$, is f not differentiable?

- (A) 0 only (B) 0 and 2 only (C) 1 and 3 only (D) 0, 1, and 3 only (E) 0, 1, 2, and 3

3. If $f(x) = -x^3 + x + \frac{1}{x}$, then $f'(-1) =$

- (A) 3 (B) 1 (C) -1 (D) -3 (E) -5

5. Let f and g be differentiable functions with the following properties:

(i) $g(x) > 0$ for all x

(ii) $f(0) = 1$

If $h(x) = f(x)g(x)$ and $h'(x) = f(x)g'(x)$, then $f(x) =$

- (A) $f'(x)$ (B) $g(x)$ (C) e^x (D) 0 (E) 1

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1975 AB 2

A particle moves along the x -axis in such a way that its position at time t for $t \geq 0$ is given by $x = \frac{1}{3}t^3 - 3t^2 + 8t$.

- (a) Show that at time $t = 0$ the particle is moving to the right.
- (b) Find all values of t for which the particle is moving to the left.
- (c) What is the position of the particle at time $t = 3$?
- (d) When $t = 3$, what is the total distance the particle has traveled?