

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

**Find the derivative.**

- 1)  $f(x) = 7x^{-4}$ , find  $f'(2)$ .  
A) -14  
B) -3.5  
C) -0.87  
D) -1.75

- 2)  $y = 6x^{-2} + 8x^3 + 11x$ , find  $f'(x)$   
A)  $-12x^{-1} + 24x^2 + 11$   
B)  $-12x^{-1} + 24x^2$   
C)  $-12x^{-3} + 24x^2 + 11$   
D)  $-12x^{-3} + 24x^2$

**Find the slope of the line tangent to the graph of the function at the given value of x.**

- 3)  $y = 9x^{5/2} - 7x^{3/2}$ ;  $x = 4$   
A) 159  
B) 6  
C) 8  
D) 36

**Find an equation for the line tangent to given curve at the given value of x.**

- 4)  $y = x^2 - x$  at  $x = -3$   
A)  $y = -7x + 6$   
B)  $y = -7x - 6$   
C)  $y = -7x - 9$   
D)  $y = -7x + 9$

**Find all values of x (if any) where the tangent line to the graph of the function is horizontal.**

- 5)  $y = x^3 - 12x + 2$   
A) -2, 0, 2  
B) 0  
C) 0, 2  
D) 2, -2

**Solve the following.**

- 6) Find all points of the graph of  $f(x) = 3x^2 + 9x$  whose tangent lines are parallel to the line  $y - 33x = 0$ .  
A) (4, 84)  
B) (7, 210)  
C) (6, 162)  
D) (5, 120)

**Give an appropriate answer.**

- 7) If  $g'(3) = 4$  and  $h'(3) = -1$ , find  $f'(3)$  for  $f(x) = 5g(x) + 3h(x) + 2$ .  
A) 19  
B) 17  
C) 23  
D) 25

**Use the product rule to find the derivative.**

- 8)  $f(x) = (x^2 - 4x + 2)(2x^3 - x^2 + 4)$   
A)  $f'(x) = 10x^4 - 36x^3 + 24x^2 + 4x - 16$   
B)  $f'(x) = 2x^4 - 32x^3 + 24x^2 + 4x - 16$   
C)  $f'(x) = 2x^4 - 36x^3 + 24x^2 + 4x - 16$   
D)  $f'(x) = 10x^4 - 32x^3 + 24x^2 + 4x - 16$

**Use the quotient rule to find the derivative.**

- 9)  $g(t) = \frac{t^2}{t - 11}$   
A)  $g'(t) = \frac{t^2}{(t - 11)^2}$   
B)  $g'(t) = \frac{22t}{(t - 11)^2}$   
C)  $g'(t) = \frac{t^2 + 22t}{(t - 11)^2}$   
D)  $g'(t) = \frac{t^2 - 22t}{(t - 11)^2}$

- 10)  $g(x) = \frac{x^2 + 5}{x^2 + 6x}$   
A)  $g'(x) = \frac{2x^3 - 5x^2 - 30x}{x^2(x + 6)^2}$   
B)  $g'(x) = \frac{6x^2 - 10x - 30}{x^2(x + 6)^2}$   
C)  $g'(x) = \frac{4x^3 + 18x^2 + 10x + 30}{x^2(x + 6)^2}$   
D)  $g'(x) = \frac{x^4 + 6x^3 + 5x^2 + 30x}{x^2(x + 6)^2}$

**Write an equation of the tangent line to the graph of  $y = f(x)$  at the point on the graph where x has the indicated value.**

- 11)  $f(x) = \frac{-10x^2 - 3}{4x + 1}$ ,  $x = 0$   
A)  $y = 12x - 3$   
B)  $y = 12x + 3$   
C)  $y = -12x - 3$   
D)  $y = -12x + 3$

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

**Provide an appropriate response.**

- 12) If  $g(-5) = 2$ ,  $g'(-5) = -2$ ,  $f(-5) = -3$ , and  $f'(-5) = -1$ , what is the value of  $h'(-5)$  where  $h(x) = f(x)g(x)$ ? Show your work.

**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question.

**Find the derivative.**

13)  $y = \sqrt{4x + 2}$

A)  $\frac{dy}{dx} = \frac{4}{\sqrt{4x + 2}}$

B)  $\frac{dy}{dx} = \frac{8}{\sqrt{4x + 2}}$

C)  $\frac{dy}{dx} = \frac{1}{\sqrt{4x + 2}}$

D)  $\frac{dy}{dx} = \frac{2}{\sqrt{4x + 2}}$

14)  $f(x) = (x^3 - 8)^{2/3}$

A)  $f'(x) = \frac{2x}{3\sqrt{x^3 - 8}}$

B)  $f'(x) = \frac{x}{3\sqrt{x^3 - 8}}$

C)  $f'(x) = \frac{2x^2}{3\sqrt{x^3 - 8}}$

D)  $f'(x) = \frac{x^2}{3\sqrt{x^3 - 8}}$

15)  $f(x) = \frac{5}{(2x - 3)^4}$

A)  $f'(x) = \frac{5}{4(2x - 3)^3}$

B)  $f'(x) = \frac{-40}{(2x - 3)^5}$

C)  $f'(x) = \frac{-40}{(2x - 3)^3}$

D)  $f'(x) = \frac{5}{8(2x - 3)^5}$

The table lists the values of the functions  $f$  and  $g$  and their derivatives at several points. Use the table to find the indicated derivative.

	$x$	1	2	3	4
	$f(x)$	1	4	3	2
16)	$f'(x)$	3	-5	1	4
	$g(x)$	2	4	1	3
	$g'(x)$	1	6	-5	1

Find  $D_x(f[g(x)])$  at  $x = 3$ .

- A) 3  
C) -5

- B) -15  
D) 1

**Find the equation of the tangent line to the graph of the given function at the given value of  $x$ .**

17)  $f(x) = (x^2 + 28)^{4/5}; x = 2$

A)  $y = \frac{4}{5}x + \frac{64}{5}$

B)  $y = \frac{8}{5}x + \frac{64}{5}$

C)  $y = \frac{8}{5}x + \frac{96}{5}$

D)  $y = \frac{8}{5}x$

**Find all values of  $x$  for the given function where the tangent line is horizontal.**

18)  $f(x) = \sqrt{x^2 + 18x + 86}$

A) 0, -9

B) -9, 9

C) 0, 9

D) -9

**Find  $dy/dx$  by implicit differentiation.**

19)  $2xy - y^2 = 1$

A)  $\frac{x}{y - x}$

B)  $\frac{x}{x - y}$

C)  $\frac{y}{y - x}$

D)  $\frac{y}{x - y}$

20)  $y\sqrt{x + 1} = 4$

A)  $\frac{2y}{x + 1}$

B)  $-\frac{2y}{x + 1}$

C)  $-\frac{y}{2(x + 1)}$

D)  $\frac{y}{2(x + 1)}$

**Find the equation of the tangent line at the given point on the curve.**

21)  $x^2 + y^2 + 2y = 0; (0, -2)$

A)  $y = -2$

B)  $y = -x - 2$

C)  $x = 0$

D)  $y = -x$

**Find the equation of the tangent line at the given value of  $x$  on the curve.**

22)  $2xy - y^2 = 1, x = 1$

A)  $y = x - 1$

B)  $x = 1$

C)  $y = -x + 1$

D)  $y = 1$