

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

**Find the derivative.**

1)  $f(x) = 3x^2 - 4x - 1$ , find  $f'(x)$  1) \_\_\_\_\_  
 A)  $3x - 4$                       B)  $6x^2 - 4$                       C)  $6x - 4$                       D)  $3x^2 - 4$

2)  $y = 13x^{-2} + 7x^3 + 1x$ , find  $f'(x)$  2) \_\_\_\_\_  
 A)  $-26x^{-3} + 21x^2$                       B)  $-26x^{-3} + 21x^2 + 1$   
 C)  $-26x^{-1} + 21x^2$                       D)  $-26x^{-1} + 21x^2 + 1$

3)  $f(x) = 9x^{7/5} - 5x^2 + 10^4$ , find  $f'(x)$  3) \_\_\_\_\_  
 A)  $\frac{63}{5}x^{2/5} - 10x + 4000$                       B)  $\frac{63}{5}x^{6/5} - 10x$   
 C)  $\frac{63}{5}x^{6/5} - 10x + 4000$                       D)  $\frac{63}{5}x^{2/5} - 10x$

4)  $f(x) = \frac{4}{\sqrt{x}} - \frac{8}{x} + \frac{7}{x^4}$ , find  $f'(x)$  4) \_\_\_\_\_  
 A)  $-\frac{2}{x^{3/2}} + \frac{8}{x^2} - \frac{28}{x^5}$                       B)  $\frac{2}{x^{1/2}} - \frac{8}{x^2} - \frac{28}{x^5}$   
 C)  $-\frac{2}{x^{3/2}} - \frac{8}{x^2} - \frac{28}{x^3}$                       D)  $-2\sqrt{x} + \frac{8}{x^2} - \frac{28}{x^3}$

**Find the derivative of the given function.**

5)  $y = (3x^2 + 5x)^2$  5) \_\_\_\_\_  
 A)  $18x^3 + 45x^2 + 25x$                       B)  $36x^3 + 45x^2 + 50x$   
 C)  $18x^3 + 45x^2 + 50x$                       D)  $36x^3 + 90x^2 + 50x$

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

6)  $y = x^4 + 3x^3 - 2x - 2$ ;  $x = -2$  6) \_\_\_\_\_  
 A)  $-4$                       B)  $-6$                       C)  $2$                       D)  $0$

7)  $y = -8x^{-1} + 5x^{-2}$ ;  $x = 2$  7) \_\_\_\_\_  
 A)  $\frac{3}{4}$                       B)  $\frac{13}{4}$                       C)  $-\frac{13}{4}$                       D)  $-\frac{3}{4}$

8)  $y = 9x^{5/2} - 7x^{3/2}$ ;  $x = 4$  8) \_\_\_\_\_  
 A)  $96$                       B)  $8$                       C)  $6$                       D)  $159$

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

9)  $y = \frac{x^2}{4}$ ;  $x = -4$  9) \_\_\_\_\_  
 A)  $y = -2x + 4$                       B)  $y = -2x - 8$                       C)  $y = -8x - 4$                       D)  $y = -2x - 4$

- 10)  $y = x^2 - 2$ ;  $x = -4$  10) \_\_\_\_\_  
 A)  $y = -4x - 18$       B)  $y = -8x - 34$       C)  $y = -8x - 36$       D)  $y = -8x - 18$
- 11)  $y = x^2 - x$ ;  $x = 4$  11) \_\_\_\_\_  
 A)  $y = 7x + 16$       B)  $y = 7x - 20$       C)  $y = 7x + 20$       D)  $y = 7x - 16$
- 12)  $y = x^3 - 16x - 3$ ;  $x = 4$  12) \_\_\_\_\_  
 A)  $y = 32x - 131$       B)  $y = 29x - 131$       C)  $y = -3$       D)  $y = 32x - 3$

**Solve the following.**

- 13) Find all points of the graph of  $f(x) = 2x^2 + 6x$  whose tangent lines are parallel to the line  $y - 34x = 0$ . 13) \_\_\_\_\_  
 A) (10, 260)      B) (8, 176)      C) (9, 216)      D) (7, 140)

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

- 14)  $y = x^2 + 2x - 3$  14) \_\_\_\_\_  
 A) 0      B)  $\frac{1}{2}$       C) -1      D) 1
- 15)  $y = x^3 - 3x^2 + 1$  15) \_\_\_\_\_  
 A) 0, 2      B) -2, 0, 2      C) 0      D) 2
- 16)  $y = x^3 + 7x^2 - 245x + 35$  16) \_\_\_\_\_  
 A)  $\frac{35}{3}, -7$       B)  $-\frac{35}{3}, 7$       C) 7      D)  $-\frac{35}{3}, \frac{35}{3}, 7$

**Give an appropriate answer.**

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

**Use the differentiation feature on a graphing calculator to find the indicated derivative.**

- 18)  $f(x) = 0.84x^3 - 3.29x^2 + 4.34x + 5.9$ ;  $f'(2)$  18) \_\_\_\_\_  
 A) 7.160      B) 7.840      C) 1.260      D) -11.900

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

- 19)  $f(x) = (5x - 6)(5x + 1)$  19) \_\_\_\_\_  
 A)  $f'(x) = 50x - 25$       B)  $f'(x) = 50x - 35$   
 C)  $f'(x) = 25x - 25$       D)  $f'(x) = 50x - 12.5$
- 20)  $f(x) = (x^2 - 4x + 2)(4x^3 - x^2 + 5)$  20) \_\_\_\_\_  
 A)  $f'(x) = 4x^4 - 68x^3 + 36x^2 + 6x - 20$       B)  $f'(x) = 20x^4 - 64x^3 + 36x^2 + 6x - 20$   
 C)  $f'(x) = 20x^4 - 68x^3 + 36x^2 + 6x - 20$       D)  $f'(x) = 4x^4 - 64x^3 + 36x^2 + 6x - 20$
- 21)  $f(x) = (5x - 5)(\sqrt{x} + 2)$  21) \_\_\_\_\_  
 A)  $f'(x) = 7.5x^{1/2} - 2.5x^{-1/2} + 10$       B)  $f'(x) = 3.33x^{1/2} - 5x^{-1/2} + 10$   
 C)  $f'(x) = 3.33x^{1/2} - 2.5x^{-1/2} + 10$       D)  $f'(x) = 7.5x^{1/2} - 5x^{-1/2} + 10$

22)  $f(x) = (6\sqrt{x} - 2)(5\sqrt{x} + 7)$

A)  $f'(x) = 30x + 32x^{1/2}$

C)  $f'(x) = 30 + 32x^{-1/2}$

B)  $f'(x) = 30 + 16x^{-1/2}$

D)  $f'(x) = 30x + 16x^{1/2}$

22) \_\_\_\_\_

23)  $(y^{-2} + y^{-1})(3y^{-3} - 7y^{-4})$

A)  $\frac{42 + 20y - 12y^2}{y^7}$

B)  $\frac{42 + 16y - 3y^2}{y^7}$

C)  $\frac{42 + 50y - 12y^2}{y^7}$

D)  $\frac{42 - 20y + 12y^2}{y^7}$

23) \_\_\_\_\_

Use the quotient rule to find the derivative.

24)  $f(x) = \frac{1}{x^7 + 2}$

A)  $f'(x) = -\frac{7x^6}{(x^7 + 2)^2}$

C)  $f'(x) = -\frac{1}{(7x^7 + 2)^2}$

B)  $f'(x) = \frac{1}{(7x^7 + 2)^2}$

D)  $f'(x) = \frac{7x^6}{(x^7 + 2)^2}$

24) \_\_\_\_\_

25)  $y = \frac{x^2 - 3x + 2}{x^7 - 2}$

A)  $\frac{dy}{dx} = \frac{-5x^8 + 19x^7 - 14x^6 - 4x + 6}{(x^7 - 2)^2}$

C)  $\frac{dy}{dx} = \frac{-5x^8 + 18x^7 - 13x^6 - 4x + 6}{(x^7 - 2)^2}$

B)  $\frac{dy}{dx} = \frac{-5x^8 + 18x^7 - 14x^6 - 3x + 6}{(x^7 - 2)^2}$

D)  $\frac{dy}{dx} = \frac{-5x^8 + 18x^7 - 14x^6 - 4x + 6}{(x^7 - 2)^2}$

25) \_\_\_\_\_

26)  $g(x) = \frac{x^2 + 5}{x^2 + 6x}$

A)  $g'(x) = \frac{x^4 + 6x^3 + 5x^2 + 30x}{x^2(x + 6)^2}$

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

B)  $g'(x) = \frac{2x^3 - 5x^2 - 30x}{x^2(x + 6)^2}$

D)  $g'(x) = \frac{6x^2 - 10x - 30}{x^2(x + 6)^2}$

26) \_\_\_\_\_

27)  $y = \frac{x^2 + 8x + 3}{\sqrt{x}}$

A)  $\frac{dy}{dx} = \frac{2x + 8}{2x^{3/2}}$

C)  $\frac{dy}{dx} = \frac{3x^2 + 8x - 3}{x}$

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

D)  $\frac{dy}{dx} = \frac{3x^2 + 8x - 3}{2x^{3/2}}$

27) \_\_\_\_\_

28)  $f(x) = \frac{(2x - 1)(3x^2 + 2)}{4x + 3}$  28) \_\_\_\_\_

A)  $f'(x) = \frac{24x^3 + 42x^2 + 18x + 20}{(4x + 3)^2}$

B)  $f'(x) = \frac{48x^3 + 42x^2 - 18x + 20}{(4x + 3)^2}$

C)  $f'(x) = \frac{48x^3 + 42x^2 - 18x + 20}{4x + 3}$

D)  $f'(x) = \frac{48x^3 + 54x^2 - 18x + 20}{(4x + 3)^2}$

**Find the derivative.**

29)  $y = (4x + 3)^5$  29) \_\_\_\_\_

A)  $\frac{dy}{dx} = 20(4x + 3)^4$

B)  $\frac{dy}{dx} = (4x + 3)^4$

C)  $\frac{dy}{dx} = 4(4x + 3)^4$

D)  $\frac{dy}{dx} = 5(4x + 3)^4$

30)  $f(x) = (x^3 - 8)^{2/3}$  30) \_\_\_\_\_

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

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

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

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

31)  $y = (x + 1)^2(x^2 + 1)^{-3}$  31) \_\_\_\_\_

A)  $\frac{dy}{dx} = -2(x + 1)(x^2 + 1)^{-4}(2x^2 - 3x - 1)$

B)  $\frac{dy}{dx} = 2(x + 1)(x^2 + 1)^{-4}(2x^2 - 3x - 1)$

C)  $\frac{dy}{dx} = -2(x + 1)(x^2 + 1)^{-4}(2x^2 + 3x - 1)$

D)  $\frac{dy}{dx} = 2(x + 1)(x^2 + 1)^{-4}(2x^2 + 3x - 1)$

32)  $y = (2x - 1)^3(x + 7)^{-3}$  32) \_\_\_\_\_

A)  $\frac{dy}{dx} = 45(2x - 1)^2(x + 7)^{-4}$

B)  $\frac{dy}{dx} = 45(2x - 1)^2(x + 7)^{-3}$

C)  $\frac{dy}{dx} = 45(2x - 1)^3(x + 7)^{-4}$

D)  $\frac{dy}{dx} = 45(2x - 1)^3(x + 7)^{-2}$

33)  $y = \frac{\sqrt[3]{x^2 + 3}}{x}$  33) \_\_\_\_\_

A)  $\frac{dy}{dx} = \frac{3}{x^2(x^2 + 3)^{2/3}}$

B)  $\frac{dy}{dx} = \frac{-x^2 - 9}{3x^2(x^2 + 3)^{2/3}}$

C)  $\frac{dy}{dx} = \frac{-3}{x^2(x^2 + 3)^{2/3}}$

D)  $\frac{dy}{dx} = \frac{x^2 + 9}{3x^2(x^2 + 3)^{2/3}}$

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

34)  $f(x) = (x^2 + 28)^{4/5}; x = 2$  34) \_\_\_\_\_

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

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

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

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

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

35)  $f(x) = \sqrt{x^2 + 12x + 42}$  35) \_\_\_\_\_  
 A) 0, -6 B) 0, 6 C) -6 D) -6, 6

Find the derivative.

36)  $y = \frac{9}{x} + 9 \sec x$  36) \_\_\_\_\_

A)  $y' = -\frac{9}{x^2} + 9 \tan^2 x$  B)  $y' = -\frac{9}{x^2} + 9 \sec x \tan x$

C)  $y' = -\frac{9}{x^2} - 9 \csc x$  D)  $y' = \frac{9}{x^2} - 9 \sec x \tan x$

37)  $y = (\csc x + \cot x)(\csc x - \cot x)$  37) \_\_\_\_\_

A)  $y' = 0$  B)  $y' = 1$   
 C)  $y' = -\csc x \cot x$  D)  $y' = -\csc^2 x$

38)  $s = t^5 \cos t - 14t \sin t - 14 \cos t$  38) \_\_\_\_\_

A)  $\frac{ds}{dt} = -5t^4 \sin t - 14 \cos t + 14 \sin t$

B)  $\frac{ds}{dt} = -t^5 \sin t + 5t^4 \cos t - 14t \cos t - 28 \sin t$

C)  $\frac{ds}{dt} = -t^5 \sin t + 5t^4 \cos t - 14t \cos t$

D)  $\frac{ds}{dt} = t^5 \sin t - 5t^4 \cos t + 14t \cos t$

39)  $r = 11 - \theta^5 \cos \theta$  39) \_\_\_\_\_

A)  $\frac{dr}{d\theta} = 5\theta^4 \sin \theta$  B)  $\frac{dr}{d\theta} = -5\theta^4 \cos \theta + \theta^5 \sin \theta$

C)  $\frac{dr}{d\theta} = 5\theta^4 \sin \theta - \theta^5 \cos \theta$  D)  $\frac{dr}{d\theta} = 5\theta^4 \cos \theta - \theta^5 \sin \theta$

40)  $s = t^4 - \csc t + 10$  40) \_\_\_\_\_

A)  $\frac{ds}{dt} = 4t^3 + \csc t \cot t$  B)  $\frac{ds}{dt} = t^3 - \cot^2 t + 10$

C)  $\frac{ds}{dt} = 4t^3 + \cot^2 t$  D)  $\frac{ds}{dt} = 4t^3 - \csc t \cot t$

Find the indicated derivative.

41) Find  $y''$  if  $y = 3 \sin x$ . 41) \_\_\_\_\_  
 A)  $y'' = 3 \cos x$  B)  $y'' = 9 \sin x$  C)  $y'' = -3 \sin x$  D)  $y'' = 3 \sin x$

42) Find  $y''$  if  $y = -4 \cos x$ . 42) \_\_\_\_\_  
 A)  $y'' = 4 \sin x$  B)  $y'' = -4 \sin x$  C)  $y'' = 4 \cos x$  D)  $y'' = -4 \cos x$

43) Find  $y''$  if  $y = 8x \sin x$ .

A)  $y'' = -8x \sin x$

C)  $y'' = 8 \cos x - 16x \sin x$

B)  $y'' = 16 \cos x - 8x \sin x$

D)  $y'' = -16 \cos x + 8x \sin x$

43) \_\_\_\_\_

Use implicit differentiation to find  $dy/dx$ .

44)  $2xy - y^2 = 1$

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

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

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

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

44) \_\_\_\_\_

45)  $\frac{x+y}{x-y} = x^2 + y^2$

A)  $\frac{x(x-y)^2 - y}{x+y(x-y)^2}$

B)  $\frac{x(x-y)^2 - y}{x-y(x-y)^2}$

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

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

45) \_\_\_\_\_

46)  $xy + x = 2$

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

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

C)  $\frac{1+y}{x}$

D)  $-\frac{1+y}{x}$

46) \_\_\_\_\_

47)  $x^6 = \cot y$

A)  $-\frac{6x^5}{\csc^2 y}$

B)  $-\frac{6x^5}{\csc y \cot y}$

C)  $\frac{6x^5}{\csc^2 y}$

D)  $\frac{\csc^2 y}{6x^5}$

47) \_\_\_\_\_

48)  $y \cos\left(\frac{1}{y}\right) = 7x + 7y$

A)  $\frac{7y}{\sin\left(\frac{1}{y}\right) + y \cos\left(\frac{1}{y}\right) - 7y}$

B)  $\frac{7 - y \sin\left(\frac{1}{y}\right)}{\cos\left(\frac{1}{y}\right) - 7}$

C)  $\frac{7}{\sin\left(\frac{1}{y}\right) + y \cos\left(\frac{1}{y}\right) - 7}$

D)  $\frac{7y^2}{\sin\left(\frac{1}{y}\right) - 7y^2}$

48) \_\_\_\_\_

Find  $dr/d\theta$ .

49)  $\theta^{4/3} + r^{4/3} = 1$

A)  $-\left(\frac{r}{\theta}\right)^{1/3}$

B)  $-\left(\frac{\theta}{r}\right)^{1/3}$

C)  $\left(\frac{\theta}{r}\right)^{1/3}$

D)  $\left(\frac{r}{\theta}\right)^{1/3}$

49) \_\_\_\_\_

50)  $r\sqrt{\theta+1} = 4$

A)  $-\frac{r}{2(\theta+1)}$

B)  $\frac{2r}{\theta+1}$

C)  $\frac{r}{2(\theta+1)}$

D)  $-\frac{2r}{\theta+1}$

50) \_\_\_\_\_

Use implicit differentiation to find  $dy/dx$  and  $d^2y/dx^2$ .

51)  $xy - x + y = 5$

51) \_\_\_\_\_

A)  $\frac{dy}{dx} = -\frac{1+y}{x+1}; \frac{d^2y}{dx^2} = \frac{2y-2}{(x+1)^2}$

B)  $\frac{dy}{dx} = \frac{y+1}{x+1}; \frac{d^2y}{dx^2} = \frac{2y+2}{(x+1)^2}$

C)  $\frac{dy}{dx} = -\frac{1+y}{x+1}; \frac{d^2y}{dx^2} = \frac{y+1}{(x+1)^2}$

D)  $\frac{dy}{dx} = \frac{1-y}{1+x}; \frac{d^2y}{dx^2} = \frac{2y-2}{(x+1)^2}$

52)  $y^2 - x^2 = 6$

52) \_\_\_\_\_

A)  $\frac{dy}{dx} = -\frac{x}{y}; \frac{d^2y}{dx^2} = \frac{y^2 - x^2}{y^3}$

B)  $\frac{dy}{dx} = \frac{x}{y}; \frac{d^2y}{dx^2} = \frac{y^2 - x^2}{y^3}$

C)  $\frac{dy}{dx} = \frac{x}{y}; \frac{d^2y}{dx^2} = \frac{y^2 - x^2}{y^2}$

D)  $\frac{dy}{dx} = \frac{x}{y}; \frac{d^2y}{dx^2} = \frac{y - x^2}{y^2}$

Answer Key

Testname: CHAPTER 2 (PART II) FORMULAS, CHAIN RULE, TRIG, AND IMPLICIT

- 1) C
- 2) B
- 3) D
- 4) A
- 5) D
- 6) C
- 7) A
- 8) D
- 9) D
- 10) D
- 11) D
- 12) A
- 13) D
- 14) C
- 15) A
- 16) B
- 17) A
- 18) C
- 19) A
- 20) C
- 21) A
- 22) B
- 23) A
- 24) A
- 25) D
- 26) D
- 27) D
- 28) B
- 29) A
- 30) D
- 31) C
- 32) A
- 33) B
- 34) A
- 35) C
- 36) B
- 37) A
- 38) C
- 39) B
- 40) A
- 41) C
- 42) C
- 43) B
- 44) D
- 45) D
- 46) D
- 47) A
- 48) A
- 49) B
- 50) A



Answer Key

Testname: CHAPTER 2 (PART II) FORMULAS, CHAIN RULE, TRIG, AND IMPLICIT

51) D

52) B