

**Exam 1**

**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question. Record your answers on your scantron.

Find the limit using the algebraic method.

$$1) \lim_{x \rightarrow -7} \frac{x^2 + 16x + 63}{x + 7}$$

A) 16

B) Does not exist

C) 2

D) 224

For the following limit, determine  $\lim_{x \rightarrow a} f(x)$ , if it exists.

$$2) \lim_{d \rightarrow 5} \sqrt{5d + 11}$$

A) 6

B) -6

C) 11

D) does not exist

State whether the function is continuous at the indicated point. If it is not continuous, tell why

$$3) g(x) = \frac{x^2 - 64}{x - 8}; x = 8$$

A) Not continuous;  $\lim_{x \rightarrow 8} g(x)$  does not existB) Not continuous;  $g(8)$  does not existC) Not continuous;  $\lim_{x \rightarrow 8} g(x)$  and  $g(8)$  exist but  $\lim_{x \rightarrow 8} g(x) \neq g(8)$ 

D) Continuous

Find the derivative of the given function.

$$4) y = (4x^2 + 5)^5$$

A)  $\frac{dy}{dx} = (40x + 5)(4x^2 + 5)^4$

B)  $\frac{dy}{dx} = 40x(4x^2 + 5)^4$

C)  $\frac{dy}{dx} = 40(4x^2 + 5)^4$

D)  $\frac{dy}{dx} = 5(4x^2 + 5)^4$

$$5) y = (1 - 3x^2)(3x^2 - 36)$$

A)  $\frac{dy}{dx} = 9x^3 + 111x$

B)  $\frac{dy}{dx} = -36x^4 + 222x^2$

C)  $\frac{dy}{dx} = -36x^3 + 222$

D)  $\frac{dy}{dx} = -36x^3 + 222x$

$$6) y = \frac{x^2}{3 - 5x}$$

A)  $\frac{dy}{dx} = \frac{-15x^2 + 6x}{(3 - 5x)^2}$

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

C)  $\frac{dy}{dx} = \frac{3x}{(3 - 5x)^2}$

D)  $\frac{dy}{dx} = \frac{5x^3 - 10x^2 + 6x}{(3 - 5x)^2}$

Find  $f'(a)$  for the given value of  $a$ .

7)  $f(x) = \frac{7}{x} - \sqrt{x}$ ,  $a = 4$

A)  $\frac{3}{16}$

B)  $\frac{11}{16}$

C)  $-\frac{11}{16}$

D)  $-\frac{3}{16}$

Find  $\frac{d^2y}{dx^2}$ .

8)  $y = 2x^4 - 7x^2 + 2$

A)  $8x^2 - 14x$

B)  $8x^2 - 14$

C)  $24x^2 - 14$

D)  $24x^2 - 14x$

For the following function, state the interval(s) for which the function is continuous.

9)  $f(x) = \frac{x^2 - 9}{x + 3}$

A)  $(-\infty, \infty)$

B)  $(-\infty, -9) \cup (-9, \infty)$

C)  $(-\infty, 3) \cup (3, \infty)$

D)  $(-\infty, -3) \cup (-3, \infty)$

Find  $f'(x)$  for the following function.

10)  $f(x) = \sqrt[8]{x^7}$

A)  $\frac{8\sqrt[7]{x}}{7}$

B)  $\frac{1}{8\sqrt{x}}$

C)  $\frac{7}{8\sqrt{x}}$

D)  $\frac{7\sqrt[8]{x}}{8}$

Determine the limit.

11)  $\lim_{x \rightarrow 4^-} f(x)$ , where  $f(x) = \begin{cases} -5x + 3 & \text{for } x < 4 \\ 2x + 4 & \text{for } x \geq 4 \end{cases}$

A) 4

B) 5

C) -17

D) 12

Give an appropriate answer.

12) Let  $\lim_{x \rightarrow -5} f(x) = 10$  and  $\lim_{x \rightarrow -5} g(x) = -2$ . Find  $\lim_{x \rightarrow -5} \left[ \frac{-7f(x) - 7g(x)}{-3 + g(x)} \right]$ .

A)  $\frac{56}{5}$

B)  $\frac{49}{3}$

C)  $\frac{84}{5}$

D) -5

**SHORT ANSWER.** Write the word or phrase that best completes each statement or answers the question. Show all work **CLEARLY** in the space provided.

Find the equation (in slope-intercept form) for the tangent to the curve at the given point.

13)  $f(x) = \sqrt{x+7}$ , (2, 3)

Equation:

.....

Find numbers a and b, so that f is continuous at every point.

14)

$$f(x) = \begin{cases} x^2, & x < -5 \\ ax + b, & -5 \leq x \leq -3 \\ x + 12, & x > -3 \end{cases}$$

a =

.....

b =

.....

Evaluate the second derivative of the function for the given value of  $x$ . Give exact answer.

15)  $f(x) = 4(1 + 3x)^5$ ;  $x = \frac{1}{3}$

Answer:

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**Solve the problem.**

16) Find all points of the graph of  $y = 5x^2 + 5x$  whose tangent lines are parallel to the line  $y - 55x = 0$ .

Point(s):

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Find  $\frac{dy}{dx}$ .

$$17) y = \left( \frac{2x + 4}{x - 4} \right)^4$$

$$\frac{dy}{dx} =$$

## Answer Key

1) C

2) A

3) B

4) B

5) D

6) B

7) C

8) C

9) D

10) C

11) C

12) A

$$13) y = \frac{1}{6}x + \frac{8}{3}$$

$$14) a = -8, b = -15$$

$$15) 5760$$

$$16) (5, 150)$$

$$17) \left( \frac{2x+4}{x-4} \right)^3 \cdot \frac{-48}{(x-4)^2}$$