

**MAC2311**  
**Ref. #: 829232**  
**Term: Spring 2015 (2014\_2)**  
**Exam #2**

Name \_\_\_\_\_

Grade \_\_\_\_\_

Student ID \_\_\_\_\_

Date \_\_\_\_\_

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

Find an equation for the tangent to the curve at the given point.

1)  $h(x) = t^3 - 9t - 4$ , (3, -4)

1) \_\_\_\_\_

Find the second derivative.

2)  $y = 3x^3 - 5x^2 + 8$

2) \_\_\_\_\_

Solve the problem.

3) Find the points where the graph of the function have horizontal tangents.

$$f(x) = x^3 - 21x$$

3) \_\_\_\_\_

Calculate the derivative of the function. Then find the value of the derivative as specified.

$$4) f(x) = \frac{8}{x+2}; f'(0)$$

4) \_\_\_\_\_



Use the formula  $f'(x) = \lim_{z \rightarrow x} \frac{f(z) - f(x)}{z - x}$  to find the derivative of the function.

5)  $f(x) = \frac{4}{x + 4}$

5) \_\_\_\_\_

Solve the problem.

6) A ball dropped from the top of a building has a height of  $s = 576 - 16t^2$  meters after  $t$  seconds. How long does it take the ball to reach the ground? What is the ball's velocity at the moment of impact?

6) \_\_\_\_\_

Find the derivative.

7)  $y = (\csc x + \cot x)(\csc x - \cot x)$

7) \_\_\_\_\_

Find the indicated derivative.

8) Find  $y'''$  if  $y = 2x \sin x$ .

8) \_\_\_\_\_

Solve the problem.

9) The driver of a car traveling at 30 ft/sec suddenly applies the brakes. The position of the car is  $s = 30t - 3t^2$ ,  $t$  seconds after the driver applies the brakes. How many seconds after the driver applies the brakes does the car come to a stop?

9) \_\_\_\_\_



Find the derivative.

10)  $s = t^3 \tan t - \sqrt{t}$

10) \_\_\_\_\_

The function  $s = f(t)$  gives the position of a body moving on a coordinate line, with  $s$  in meters and  $t$  in seconds.

11)  $s = 5t^2 + 4t + 6, 0 \leq t \leq 2$

11) \_\_\_\_\_

Find the body's speed and acceleration at the end of the time interval.

Find the derivative.

12)  $y = 2x^2 e^{-x}$

12) \_\_\_\_\_

**Solve the problem.**

13) A rock is thrown vertically upward from the surface of an airless planet. It reaches a height of  $s = 120t - 3t^2$  meters in  $t$  seconds. How high does the rock go? How long does it take the rock to reach its highest point?

13) \_\_\_\_\_

**Find the derivative.**

14)  $r = 2 - \theta^4 \cos \theta$

14) \_\_\_\_\_

**Find the derivative of the function.**

15)  $f(t) = (6 - t)(6 + t^3)^{-1}$

15) \_\_\_\_\_



Find  $y'$ .

16)  $y = (x^2 - 2x + 2)(4x^3 - x^2 + 4)$

16) \_\_\_\_\_

The equation gives the position  $s = f(t)$  of a body moving on a coordinate line ( $s$  in meters,  $t$  in seconds).

17)  $s = 8 \sin t - \cos t$

17) \_\_\_\_\_

Find the body's velocity at time  $t = \pi/4$  sec.

Provide an appropriate response.

18) Find an equation for the tangent to the curve  $y = \frac{10x}{x^2 + 1}$  at the point  $(1, 5)$ .

18) \_\_\_\_\_

Find the derivative.

19)  $s = t^8 - \csc t + 13$

19) \_\_\_\_\_

Solve the problem.

20) Find an equation of the tangent to the curve  $f(x) = \sqrt{x+2}$  that has slope  $\frac{1}{4}$ .

20) \_\_\_\_\_

Find the derivative.

21)  $y = \frac{10}{\sin x} + \frac{1}{\cot x}$

21) \_\_\_\_\_



# Answer Key

## Testname: MAC2311 - EXAM #2

- 1)  $y = 18t - 58$
- 2)  $18x - 10$
- 3)  $(-\sqrt{7}, 14\sqrt{7}), (\sqrt{7}, -14\sqrt{7})$
- 4)  $f'(x) = -\frac{8}{(x+2)^2}; f'(0) = -2$
- 5)  $-\frac{4}{(x+4)^2}$
- 6) 6 sec, -192 m/sec
- 7)  $y' = 0$
- 8)  $y''' = -2x \cos x - 6 \sin x$
- 9) 5 sec
- 10)  $\frac{ds}{dt} = t^3 \sec^2 t + 3t^2 \tan t - \frac{1}{2\sqrt{t}}$
- 11) 24 m/sec, 10 m/sec<sup>2</sup>
- 12)  $2xe^{-x}(2-x)$
- 13) 1200 m, 20 sec
- 14)  $\frac{dr}{d\theta} = -4\theta^3 \cos \theta + \theta^4 \sin \theta$
- 15)  $f'(t) = \frac{2t^3 - 18t^2 - 6}{(6+t^3)^2}$
- 16)  $20x^4 - 36x^3 + 30x^2 + 4x - 8$
- 17)  $\frac{9\sqrt{2}}{2}$  m/sec
- 18)  $y = 5$
- 19)  $\frac{ds}{dt} = 8t^7 + \csc t \cot t$
- 20)  $y = \frac{1}{4}x + \frac{3}{2}$
- 21)  $y' = -10 \csc x \cot x + \sec^2 x$