

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Given that  $f$  is continuous and the following information:

Intervals	$x < -5$	$-5 < x < 1$	$1 < x$
Sign of $f'$	+	-	+

- a) For what  $x$ -coordinate(s) is there a local minimum?
- b) For what  $x$ -coordinate(s) is there a local maximum?
2. Given that  $f'(x) > 0$  for all  $x$  in the domain of  $f$ .

What can be said about the number of solutions of  $f(x) = 7$ ?

- a) 0
- b) 1
- c) 0 or 1
- d) 2
- e) not enough information
3. What is the average rate of change over  $2 \leq t \leq 4$ ?

$t$	2	3	4	5	6
$f(t)$	1.8	3.4	4.6	6.4	8.4

- a) 2.8                      b) 1.4                      c) -2.8
- d) -1.4                      e) 0.714

4. Show that  $f(x) = x^3 + 2x^2 - 9x - 18$  satisfies Rolle's Theorem on  $[-3, -2]$  and find the corresponding value of  $c$  that the theorem guarantees.

5. Tony drives out to the lake in 3 hours. If he covered 250 km, explain why he should get a speeding ticket if the speed limit is 80 km/h.

6. Find all points of inflection:  $f(x) = x^3 - 12x$
- a)  $(0, 0)$ ,  $(\pm\sqrt{12}, 0)$                       b)  $(0, 0)$
- c)  $(2, 0)$ ,  $(-2, 0)$                       d)  $(2, -16)$ ,  $(-2, 16)$
- e)  $(0, 0)$ ,  $(2, -16)$

7. Given a curve is defined by the equation  $f(x) = (1 - \ln x)^2$ . Find a point of inflection.
- a)  $(2e, e)$                       b)  $(1, 0)$                       c)  $(2e^2, 1)$
- d)  $(e^{-2}, e)$                       e)  $(e^2, 1)$

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8. Find  $y'$  given  $y = e^{\sin \sqrt{x}}$ .
- a)  $\frac{\cos \sqrt{x}}{2\sqrt{x}} e^{\sin \sqrt{x}}$       b)  $(\cos \sqrt{x}) e^{\sin \sqrt{x}}$
- c)  $(\sin \sqrt{x}) e^{\sin \sqrt{x}-1}$       d)  $\frac{e^{\cos \sqrt{x}}}{2\sqrt{x}}$
- e)  $\frac{(\sin \sqrt{x}) e^{\sin \sqrt{x}}}{\sqrt{x}}$
9. Find  $\frac{dy}{dx}$  for  $y = \ln \sqrt{x^2 - 5}$ .
- a)  $\frac{x}{\sqrt{x^2 - 5}}$       b)  $\frac{2x}{\sqrt{x^2 - 5}}$       c)  $\frac{x}{x^2 - 5}$
- d)  $\frac{1}{x}$       e)  $e^x \cdot e^{x^2-5}$
10. Let  $y^2 e^{2x} + 3x = y^3$ . Find  $y'$ .
- a)  $\frac{2y^2 e^{2x} + 3}{3y^2 - 2ye^{2x}}$       b)  $\frac{e^{2x} - 3}{4}$       c)  $\frac{ye^{2x} + 3}{y - e^{2x}}$
- d)  $\frac{1 - 3y}{e^{2x}(3 - 2y)}$       e)  $\frac{e^{2x} - 3y}{e^{2x} - y^2}$
11. A stone dropped in a still pond creates a circular ripple whose radius increases at a constant rate of 2 ft/s. At what rate is the area enclosed by the ripple increasing 10 s after the stone strikes the pond?
- a)  $60\pi \text{ ft}^2/\text{s}$       b)  $200\pi \text{ ft}^2/\text{s}$       c)  $120\pi \text{ ft}^2/\text{s}$
- d)  $40\pi \text{ ft}^2/\text{s}$       e)  $80\pi \text{ ft}^2/\text{s}$
12. A small rocket is projected vertically upward with an initial velocity of 128 ft/sec and moves according to the law  $s = 128t - 16t^2$ . How many seconds will it be before it reaches its maximum height?
- a) 6      b) 32      c) 4      d) 112      e) 8
13. A particle moves along the curve given by  $y = \sqrt{2x^3 - 7}$ . Find the acceleration at 2 seconds.
- a)  $-\frac{3}{4}$  units/sec<sup>2</sup>      b)  $-\frac{4}{3}$  units/sec<sup>2</sup>
- c) 4 units/sec<sup>2</sup>      d)  $\frac{3}{4}$  units/sec<sup>2</sup>
- e)  $\frac{4}{3}$  units/sec<sup>2</sup>
14. What are the exact values of the coordinates of the point on  $y = 2x + 3$  that is closest to the point (0, 0)?

## BC Calculus

## Classwork/Homework Apps of Derivative Packet 2

Name \_\_\_\_\_

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15. The product of two positive numbers is 588. The sum of the first and three times the second is minimized. Find the two numbers.

- a) 42 and 14                      b) 28 and 21  
c) 49 and 12                      d) 84 and 7  
e) Both numbers are  $14\sqrt{3}$

16. What is the maximum area of a rectangle that can be inscribed in a semi-circle of radius 8 cm?

17. A ladder 12 ft in length leans against a vertical wall, with the bottom of the ladder 3 ft from the wall on a horizontal floor. If at that time the bottom end of the ladder is being pulled away at the rate of 0.5 ft/s, at what rate does the top of the ladder slip down the wall?

- a)  $\frac{\sqrt{15}}{30}$  ft/s                      b) 2 ft/s                      c)  $3\sqrt{15}$  ft/s  
d)  $\frac{\sqrt{15}}{3}$  ft/s                      e)  $2\sqrt{15}$  ft/s

1.  
Answer: 1, -5  
CodePath: EAS.APC.D.E.48
2.  
Answer: c  
CodePath: EAS.APC.D.E.44
3.  
Answer: b  
CodePath: EAS.APC.D.I.1
4.  
Answer:  $\frac{-2 - \sqrt{31}}{2}$   
CodePath: EAS.APC.D.F.9
5.  
Answer:  
CodePath: EAS.APC.D.G.31
6.  
Answer: b  
CodePath: EAS.APC.D.J.1
7.  
Answer: e  
CodePath: EAS.APC.D.J.14
8.  
Answer: a  
CodePath: EAS.APC.D.N.13
9.  
Answer: c  
CodePath: EAS.APC.D.N.32
10.  
Answer: a  
CodePath: EAS.APC.D.N.58
11.  
Answer: e  
CodePath: EAS.APC.E.J.6
12.  
Answer: c  
CodePath: EAS.APC.E.I.54
13.  
Answer: b  
CodePath: EAS.APC.E.I.46

14.  
Answer:  $(-\frac{6}{5}, \frac{3}{5})$   
CodePath: EAS.APC.E.H.51
15.  
Answer: a  
CodePath: EAS.APC.E.H.1
16.  
Answer: 64  
CodePath: EAS.APC.E.H.49
17.  
Answer: a  
CodePath: EAS.APC.E.J.38