

Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

## NON-CALCULATOR Section

Vocabulary: **Directions** – Define each word *and* give an example.

1. Critical Point
2. Relative Maximum

Short Answer

3. Describe how to determine the absolute minimum of a continuous function on a closed interval.
4. How do you find an inflection point of a function (without graphing)?
5. Explain the Mean Value Theorem graphically.

Review

6. What is the instantaneous rate of change at  $x = 2$  for the function  $f$  given by  $f(x) = \frac{x^2 - 2}{x - 1}$ ?
7. What is the maximum acceleration attained on the interval  $0 \leq t \leq 3$  by the particle whose velocity is given by  $v(t) = t^3 - 3t^2 + 12t + 4$ ?

Unit Two Problems

**Directions:** Show all work completed to obtain your final answers. Partial credit may be given for incorrect answers. No credit may be given for problems without work if it is required to obtain the answer. Circle or box in your final answers.

8. What are all values of  $x$  for which the function  $f$  defined by  $f(x) = (x^2 - 3)e^{-x}$  is increasing?

9. What is the  $x$ -coordinate of the point of inflection of the graph of  $y = \frac{1}{3}x^3 + 5x^2 + 24$ ?

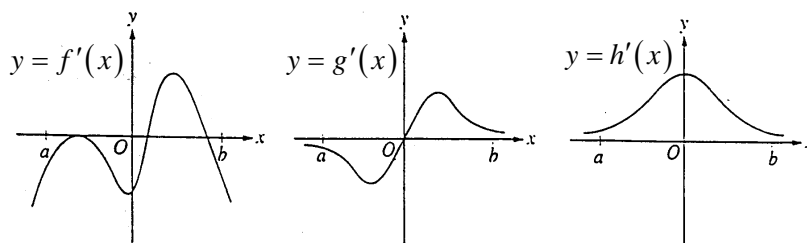
Multiple Choice Questions: Circle the best answer.

10. Let  $f$  be the function given by  $f(x) = |x|$ . Which of the following statements about  $f$  are true?

- I.  $f$  is continuous at  $x = 0$ .
- II.  $f$  is differentiable at  $x = 0$ .
- III.  $f$  has an absolute minimum at  $x = 0$ .

(A) I only      (B) II only      (C) III only      (D) I and III only      (E) II and III only

11. The graphs of the **derivatives** of the functions  $f$ ,  $g$ , and  $h$  are shown below.



Which of the functions,  $f$ ,  $g$ , or  $h$  have a relative maximum on the open interval  $a < x < b$ ?

(A)  $f$  only      (B)  $g$  only      (C)  $h$  only      (D)  $f$  and  $g$  only      (E)  $f$ ,  $g$ , and  $h$

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Multiple Choice Questions: Circle the best answer.

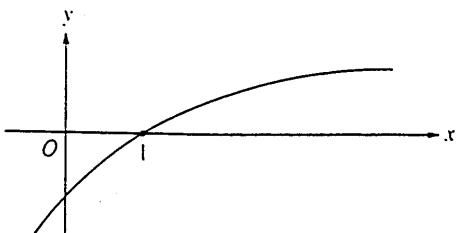
12. The first derivative of the function  $f$  is given by  $f'(x) = \frac{\cos^2 x}{x} - \frac{1}{5}$ . How many critical values does  $f$  have on the open interval  $(0,10)$ ?

- (A) One                      (B) Three                      (C) Four                      (D) Five                      (E) Seven

13. The graph of the function  $y = x^3 + 6x^2 + 7x - 2\cos x$  changes concavity at  $x =$

- (A) -1.58                      (B) -1.63                      (C) -1.67                      (D) -1.89                      (E) -2.33

14. The graph of a twice-differentiable function  $f$  is shown in the figure below.



Which of the following is true?

- (A)  $f(1) < f'(1) < f''(1)$   
(B)  $f(1) < f''(1) < f'(1)$   
(C)  $f'(1) < f(1) < f''(1)$   
(D)  $f''(1) < f(1) < f'(1)$   
(E)  $f''(1) < f'(1) < f(1)$