For each question, answer “E) NOTA” means none of the given answers are correct.

1. For what value of is differentiable at every ?
2. -2/3 B) 0 C) 2/3 D) 4/3 E) NOTA
3. Evaluate
4. 12 B) 8 C) 6 D) 1 E) NOTA
5. Suppose that and are integrable and that . Find .
6. 30 B) 32 C) 34 D) 38 E) NOTA
7. Let . Find .
8. 16 B) 8 C) 4 D) 1/4 E) NOTA
9. Consider the following: . What is the value of ?
10. Limit does not exist B) 1/16 C) 1/32 D) 1/64 E) NOTA
11. The hypotenuse of a right triangle ABC remains constant at 5 feet as both legs are changing. One leg, AC, is decreasing at the rate of 2 feet per second. In order for the hypotenuse to remain at 5 feet, the other leg BC is increasing. The rate, in square feet per second, at which the area is changing when AC = 4 is:
12. 7/2 B) 7/3 C) -7/6 D) -7/2 E) NOTA
13. If , which of the following are equal to
14. II. III.
15. I only B) II only C) II and III only D) I and III only E) NOTA
16. Evaluate the following integral:
17. B) C) D) E) NOTA
18. What is the tangent of the angle at which the curve cuts the x-axis?
19. B) C) D) E) NOTA
20. Evaluate the following:
21. Does not exist B) C) D) E) NOTA
22. Which of the following statements are true?
23. If f is undefined at x = c, then the limit of f(x) as x approaches c must not exist
24. If the limit of f(x) as x approaches c is 0, then there must exist a number k such that f(k) < 0.001
25. If , then f(c) = L.
26. Statement I only C) Statements I and III only E) NOTA
27. Statement II only D) Statements II and III only
28. Water is being pumped into an inverted conical tank. The tank has height of 12 feet and the radius at the top is 4 feet. If the water level is rising at a rate of 1.5 feet per minute when the height of the water is 2 feet, what is the rate at which the volume of the dry portion of the cone is changing in cubic feet per minute?
29. B) C) D) E) NOTA
30. For each of the following statements, determine whether it is true or false. A true statement is worth 2, while a false statement is worth -1. What is the total sum of the statements’ values?
31. If is an even function, then exists.
32. If is decreasing on its domain, then is decreasing on its domain.
33. If , then .
34. If are one-to-one functions, then
35. 8 B) 5 C) 2 D) -4 E) NOTA
36. A point p is a *limit point* of a set E if every open interval of p contains a point q ≠ p such that q is an element of E. With this information in mind, which of the below statements is FALSE concerning the following sets:

I: in the Real number line has exactly 2 limit points.

II: in the Real number line contains 3 limit points.

III: in the Real number line contains all of its limits points.

1. Statement I only C) Statements I and II E) NOTA
2. Statements III only D) Statements II and III
3. If has a local extreme value at , then find the value of and tell if has a local maximum or local minimum at that point.
4. ; local max C) ; local max E) NOTA
5. ; local min D) ; local min
6. Find the area of the region enclosed by the parabola and the line
7. 59/27 B) 19/9 C) 32/27 D) 10/9 E) NOTA

Consider the following function for questions 17 and 18.

1. Let, , and . What is the value of ?
2. Cannot be computed since one or more of the limits does not exist
3. -3/81
4. -2/81
5. 3/81
6. NOTA
7. Which of the following statements is TRUE?
8. is continuous on the interval C) E) NOTA
9. D)
10. What function has the property that and p(0) = -1?

1. C) E) NOTA
2. D)
3. Emily is on a plane! She likes to fly her plane over the New York coastline, assuming no snakes are in her plane. Emily’s speed (in miles per hour) at times during the day is given in the table below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Time | 9AM | 9:30AM | 10AM | 10:30AM | 11AM | 11:30AM |
| Speed | 124 | 110 | 136 | 94 | 100 | 120 |

Using a right Riemann sum, Emily would like to approximate the total distance she traveled from 9AM to 11AM. Which of the following best approximates the distance Emily traveled in this time interval?

1. 170 B) 220 C) 232 D) 282 E) NOTA
2. A rectangular sheet of paper is to contain 72 square inches of printed matter with 2 inch margins at the top and bottom and one inch margins on each side. Let represent the width and length, respectively, of the sheet that uses the least paper. What is the value of ?
3. 1/2 B) 2/3 C) 3/2 D) 4/3 E) NOTA
4. Consider the function . What is ? Does exist?
5. C) E) NOTA
6. D)
7. If , and is written in the completely reduced and rationalized form , where a, b, c > 0 and a and c are relatively prime, what is b – ca?
8. 15 B) 14 C) 10 D) 9 E) NOTA
9. What is the volume of the solid formed by revolving the region bounded by the graphs , , and about the y-axis?
10. B) C) D) E) NOTA
11. Mrs. Linder needs help! She forgot how to use the Trapezoidal Rule to approximate the value of . In particular, she forgot the number of intervals (called ) that is needed to ensure the error of the approximation is less than 0.01. What is the smallest (rounded to the nearest integer) that Mrs. Linder can use?
12. 12 B) 11 C) 9 D) 8 E) NOTA
13. The curves (i), (ii), and (iii) in the graph below are the graphs of and its first and second derivatives. Which curve is , which is , and which is ?



1. (i) (ii) (iii) C) (i) (ii) (iii) E) NOTA
2. (i) (ii) (iii) D) (i) (ii) (iii)
3. If a ball is thrown intp the air with a velocity of 80 ft/sec, its height in feet after seconds is given by . It will be at maximum height when its instantaneous velocity is zero. What is the average velocity from the time it is thrown ( to the time it reaches its maximum height?
4. 100 B) 60 C) 48 D) 32 E) NOTA
5. Evaluate the following:
6. C) E) NOTA
7. D)
8. Given that , which of the following is true concerning ?
9. is independent of all values of x.
10. is positive for y > 0
11. is continuous over the y-interval of [-1, 1]
12. = 25 when x = 1 and y = 1
13. NOTA
14. Evaluate the sum:
15. 0 C) 9 E) NOTA
16. 1 D)