**Calculus 1 Final Exam Review**

**Worksheet**

Organic Chemistry Tutor

1. Evaluate the limit shown below:

A. 4/3 C. 7/5

B. -2 D. 1

E. -5

2. Evaluate the expression shown below:

3. Find the value of c that makes f(x) continuous.

A. 1 C. 3

B. 2 D. 4

E. 5

4. Find the derivative of the expression shown below:

5. Evaluate the following integral:

6. Find the equation of the tangent line to the curve x3 + 4xy2 + y3 = 107 at the point (2, 3) using implicit differentiation.

A. 16x – 25y = 107 C. 25y – 16x = -107

B. 16x + 25y = -107 D. 16x + 25y = 107

7. Which of the following answer choices is equivalent to the expression shown below?

A. cos (x) C. tan (x)

B. ln (x) D. sin (x) – h

E. cos (x + h)

8. Evaluate the integral shown below:

9. Water is flowing into a cylinder with a diameter of 6 ft and a height of 10 ft. If the height of the water in the cylinder is increasing at 3 ft/min, at what rate is the volume of the water in the cylinder changing?

10. Identify all intervals where f(x) is increasing given f(x) = x3 + 3/2 x2 – 36x – 9.

11. Identify the location and maximum value of the function f(x) = 16x – x2 + 5.

A. (7, 68) C. (11, 125)

B. (8, 69) D. (-9, 84)

E. (10, 65)

12. Calculate the average value of the function

f(x) = x3 + 8x – 4 over the interval [1, 5].

A. 32 C. 59

B. 47 D. 83

E. 105

13. Evaluate the expression shown below:

14. Evaluate the limit expression shown below:

A. +1/4 C. -8

B. -2/3 D. 12

E. -1/16

15. Identify all intervals where the function

f(x) = x3 – 6x2 + 5x + 1 is concave downward.

16. Perform the operation shown below:

17. Calculate the average rate of change of the function f(x) = x2 – 5x + 2 over the interval [1, 5].

A. +1 C. +2

B. -3 D. -5

E. +8

18. Evaluate the limit shown below:

A. -18 C. -63

B. +27 D. +81

E. +108

19. Evaluate the expression shown below:

20. Find the area of the region bounded by y = x/2 and y = .

A. 5/6 C. 12

B. 4 D. 4/3

E. 16/3

21. Calculate the value of the solid formed by revolving the region bounded by y = , y = 0, and x = 3 about the line x = 6.

22. Calculate the volume generated by rotating the region bounded by y = x2, y = 0, x = 1, and x = 2 about the line x = 4.

23. Evaluate the limit shown below:

24. Perform the indicated operation shown below:

25. Which of the following answer choices is equivalent to the expression shown below?

A. e-3 C. 1/e

B. e-2 D. e

E. e2

26. Perform the indicated operation shown below:

27. Find the value of c guaranteed by Rolle’s Theorem in the function f(x) = x2 – 8x + 12 on the interval [2, 6].

A. c = 1 C. c = 3

B. c = 2 D. c = 4

E. c = 5

28. Use linear approximation to estimate (3.99)3.

29. Find the value of c guaranteed by the mean value theorem in the function f(x) = x3 – 4x on the interval [-2, 4].

A. c = -2 C. c = 1

B. c = -1 D. c = 2

E. c = 3

30. Evaluate the limit shown below:

31. A ball is thrown upward at 96 ft/s from a height of 256 ft. The height of the ball with respect to time is given by the equation h(t) = -16t2 + 96t + 256. (a) How long will it take the ball to hit the ground? (b) What will the velocity of the ball be 4 seconds after it is thrown? (c) Calculate the velocity of the ball just before it hits the ground. (d) Calculate the maximum height of the ball.

32. The acceleration of a particle is given by

a(t) = 2t – 6. The initial velocity of the particle is 8 ft/s and is located 5 ft east of the origin along the x-axis at t = 1. (a) Write a function for the velocity of the particle v(t). (b) When is the particle moving to the right? (c) What is the position of the particle at t = 5? (d) Calculate the displacement and total distance traveled by the particle in the first 6 seconds.

33. Perform the indicated operation shown below:

34. Using the table shown below, what is the value of (f o g)’(2)?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | 1 | 2 | 3 | 4 |
| f(x) | 1 | 3 | 8 | -3 |
| g(x) | 0 | 4 | 5 | 9 |
| f’(x) | -6 | 1 | -2 | 7 |
| g’(x) | -4 | -5 | 11 | 6 |

35. The rate of water flowing into an empty tank can be modeled by the equation R(t) = 0.1t2 + 0.4t + 12 where R(t) is in gal/min and t > 0. Calculate the total volume of water accumulated in the tank after 10 minutes.

36. If = -7, and = -12, then

= ?

37. Which of the following statements about f(x) is false?

Diagram

Description automatically generated

A. The limit as x approaches 4 exists in f(x).

B. f(x) has an infinite discontinuity at x = 3.

C. f(x) has a jump discontinuity at x = 1.

D. f(4) = 2.

E. The limit as x approaches 1 equals 3 in f(x).

38. Evaluate the definite integral shown below:

A. 25π C. 25π/4

B. 5π/2 D. 25

39. The table below shows the velocity of an object where v(t) is in m/s and t is in seconds. Use the midpoint rule (n = 5) to estimate the total distance traveled by the object.

|  |  |
| --- | --- |
| t | v(t) |
| 0 | 12 |
| 5 | 13 |
| 10 | 14 |
| 15 | 13 |
| 20 | 15 |
| 25 | 14 |
| 30 | 16 |
| 35 | 17 |
| 40 | 16 |
| 45 | 18 |
| 50 | 19 |

40. A farmer wants to set up a rectangular fence adjacent to a river as shown below. The area of the field is 16,200 ft2. (a) What dimensions will require the least amount of fencing if no fencing is needed along the river?

Shape

Description automatically generated

**Answers:**

1. A

2.

3. E

4.

5.

6. D

7. A

8.

9. +27π ft3 / min

10. (-, -4)U(3,)

11. B

12. C

13. 16X (3X – 7) [2X3 – 7X2]7

14. E

15. (-, 2)

16.

17. A

18. 108

19.

20. D

21.

22. 67π/6

23. 3/5

24.

25. B

26.

27. D

28. (3.99)3 ~ 63.52, (3.99)3 = 63.521199

29. D

30. The limit does not exist (DNE)

31. (a) t = 8s. (b) -32 ft/s (c) -160 ft/s (d) 400 ft

32. (a) v(t) = t2 – 6t + 8. (b) Right [0, 2)U(4, +)

(c) s(t) = +19/3 ft

(d) displacement = 12 ft, total distance = 44/3ft

33.

34. -35

35. 520/3 gallons

36. -5

37. E

38. C

39. total distance ~ 750 m

40. x = 180 ft, y = 90 ft