**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?



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?



**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