

NOMBRE: \_\_\_\_\_ CÉDULA: \_\_\_\_\_ N° DE LISTA: \_\_\_\_\_ ID: A

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**Laboratorio #1 de Matemática III (La antiderivada y la integral Definida)**

Determine la solución de las siguientes expresiones:

1. Evaluate the integral.

$$\int_1^5 (5 + 8x - 12x^3) dx$$

2. Evaluate the integral.

$$\int_0^6 (2v + 9)(9v - 4) dv$$

3. Evaluate the integral.

$$\int_{16}^{36} \frac{3x - 5}{\sqrt{x}} dx$$

4. The marginal cost of manufacturing  $x$  yards of a certain fabric is  $C'(x) = 5 - 0.01x + 0.000006x^2$  (in dollars per yard). Find the increase in cost if the production level is raised from 4,000 yards to 6,000 yards.

5. Suppose  $h$  is a function such that  $h(5) = -2$ ,  $h'(5) = 2$ ,  $h''(5) = 7$ ,  $h(6) = 4$ ,  $h'(6) = 4$ ,  $h''(6) = 8$ , and  $h''$  is continuous everywhere. Evaluate  $\int_5^6 h''(u) du$ .

6. Evaluate the integral by interpreting it in terms of areas.

$$\int_0^{16} |x - 8| dx$$

**Resuelva los siguientes problemas sobre la antideivada**

7. Given that the graph of  $f$  passes through the point  $(2, 22)$  and that the slope of its tangent line at  $(x, f(x))$  is  $4x + 3$ , find  $f(3)$ .

$$f(3) = \underline{\hspace{2cm}}$$

8. A company estimates that the marginal cost (in dollars per item) of producing  $x$  items is  $1.99 - 0.004x$ . If the cost of producing one item is \$544, find the cost of producing 100 items.

Round the answer to the nearest cent.

$$C(100) \approx \underline{\hspace{2cm}}$$

## Short Answer

9. Find the most general antiderivative of  $f(x) = 6x^2 - 6x + 8$ .

10. Find the most general antiderivative of  $f(x) = 8x^{3/5} - 9x^{4/5}$ .

11. Find the most general antiderivative of the function on the interval  $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ .

$$f(x) = 4e^x + 7\sec^2 x$$

12. Find  $f$  if  $f''(x) = \cos x$ .

13. Find  $f$  if  $f'(t) = 8\cos t + \sec^2 t$  for  $-\frac{\pi}{2} < t < \frac{\pi}{2}$  and  $f\left(\frac{\pi}{3}\right) = 8$ .

14. Find  $f$  if  $f''(\theta) = \sin \theta + \cos \theta$ ,  $f(0) = 0$ , and  $f'(0) = 2$ .

15. Find  $f$ , given that

$$f''(t) = 3e^t + 8\sin t, \quad f(0) = 0, \quad f(\pi) = 0$$

16. A particle has velocity  $v(t) = \sin t - \cos t$  and its initial position is  $s(0) = 1$ . Find the position function of the particle.

17. Find the general indefinite integral.

$$\int x(9 + 8x^4) dx$$

18. Find the general indefinite integral.

$$\int (1 - t)(6 + t^2) dt$$

19. Find the general indefinite integral. Enclose all angles in parenthesis.

$$\int \frac{6\sin 2t}{\sin t} dt$$

20. Evaluate the integral.

$$\int_{\frac{3\pi}{4}}^{\frac{5\pi}{3}} \sec \theta \tan \theta d\theta$$

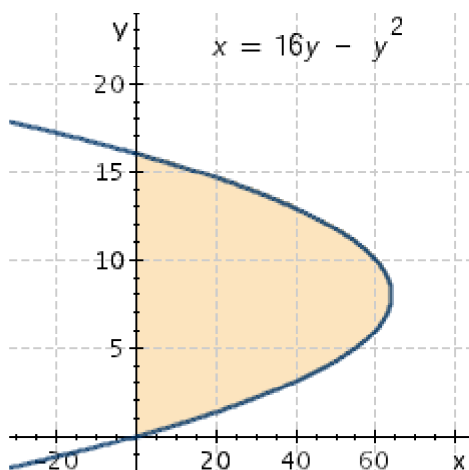
21. Evaluate the integral.

$$\int_0^{\frac{\pi}{4}} \frac{2 + \cos^2 \theta}{\cos^2 \theta} d\theta$$

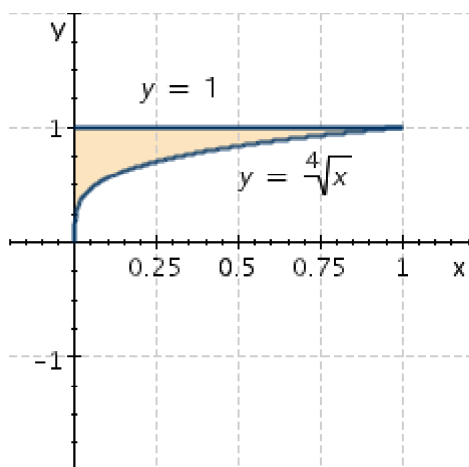
22. Evaluate the integral. Express your answer as a fraction, where necessary.

$$\int_0^1 (4 + x^2)^3 dx$$

23. The area of the region that lies to the right of the  $y$ -axis and to the left of the parabola  $x = 16y - y^2$  (the shaded region in the figure) is given by the integral  $\int_0^{16} (16y - y^2) dy$ . (Turn your head clockwise and think of the region as lying below the curve  $x = 16y - y^2$  from  $y = 0$  to  $y = 16$ .) Find the area of the region. Express your answer as a fraction, where necessary.



24. The boundaries of the shaded region are the  $y$ -axis, the line  $y = 1$ , and the curve  $y = \sqrt[4]{x}$ . Find the area of this region by writing  $x$  as a function of  $y$  and integrating with respect to  $y$ .



25. Use the Fundamental Theorem of Calculus to evaluate the integral.

$$\int_8^{27} \sqrt[3]{x} dx$$

26. Use the Fundamental Theorem of Calculus to evaluate the integral.

$$\int_{6\pi}^{9\pi} \cos \theta d\theta$$

27. Use the Fundamental Theorem of Calculus to evaluate the integral.

$$\int_0^{\frac{\pi}{4}} \sec^2 t dt$$

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28. Find the exact area of the region that lies beneath the given curve.

$$y = 5 \sin(x), \quad 0 \leq x \leq \frac{\pi}{6}$$

29. Evaluate the integral.

$$\int_{-1}^0 (5x^4 + e^x) dx$$

30. Evaluate  $\int_0^2 (3e^x + 4 \cos x) dx$ .

**Laboratorio #1 de Matemática III (La antiderivada y la integral Definida)****Answer Section****NUMERIC RESPONSE**

1. ANS:  
-1,756
2. ANS:  
2,394
3. ANS:  
284
4. ANS:  
\$214,000
5. ANS:  
2
6. ANS:  
64

**COMPLETION**

7. ANS: 35
8. ANS: \$721.01

**SHORT ANSWER**

9. ANS:  
 $2x^3 - 3x^2 + 8x + C$
10. ANS:  
 $5x^{\frac{8}{5}} - 5x^{\frac{9}{5}} + C$
11. ANS:  
 $F(x) = 4e^x + 7\tan(x) + C$
12. ANS:  
 $-\cos(x) + C \cdot x + D$
13. ANS:  
 $f(t) = 8\sin(t) + \tan(t) + 8 - 5\sqrt{3}$
14. ANS:  
 $-\sin(\theta) - \cos(\theta) + 3\theta + 1$
15. ANS:  
 $f(t) = 3e^t - 8\sin(t) + \frac{3 - 3e^\pi}{\pi} \cdot t - 3$
16. ANS:  
 $s(t) = -\cos(t) - \sin(t) + 2$
17. ANS:  
 $\frac{9}{2} \cdot x^2 + \frac{4}{3} \cdot x^6 + C$
18. ANS:  
 $6t - 3t^2 + \frac{1}{3} \cdot t^3 - \frac{1}{4} \cdot t^4 + C$
19. ANS:  
 $12\sin(t) + C$
20. ANS:  
 $2 + \sqrt{2}$

21. ANS:  
 $2 + \frac{\pi}{4}$
22. ANS:  
 $\frac{2889}{35}$
23. ANS:  
 $\frac{2048}{3}$
24. ANS:  
 $\frac{1}{5}$
25. ANS:  
 $\frac{195}{4}$
26. ANS:  
0
27. ANS:  
 $\tan\left(\frac{\pi}{4}\right)$
28. ANS:  
 $-5\cos\left(\frac{\pi}{6}\right) + 5$
29. ANS:  
 $2 - \frac{1}{e}$
30. ANS:  
 $3e^2 + 4\sin(2) - 3$