Ejercicios de Integrales

Cálculo

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Contenido

Use la Parte 1 del Teorema Fundamental del Cálculo para encontrar la derivada de la función.

1. $g(x) = \int_1^x \dfrac{1}{t^3 + 1} dt$

2. $g(x) = \int_1^x (2 + t^4)^5 dt$

3. $g(s) = \int_5^s (t - t^2)^8 dt$

4. $g(r) = \int_0^r \sqrt{x^2 + 4} dx$

5. $F(x) = \int_x^\pi \sqrt{1 + \sec t} dt$

$$\left[\int_x^\pi \sqrt{1 + \sec t} dt = - \int_\pi^x \sqrt{1 + \sec t} dt \right]$$

6. $G(x) = \int_1^x \cos\sqrt{t} dt$

7. $h(x) = \int_2^{1/x} \sin^4 t dt$

8. $h(x) = \int_1^{\sqrt{x}} \dfrac{z^2}{z^4 + 1} dz$

9. $y = \int_0^{tanx} \sqrt{t + \sqrt{t}} dt$

10. $y = \int_0^{x^4} \cos^2\theta d\theta$

11. $y = \int_{1-3x}^1 \dfrac{u^3}{1 + u^2} du$

12. $y = \int_{sinx}^1 \sqrt{1 + t^2} dt$

Evaluar la integral.

13. $\int_{-1}^2 (x^3 - 2x) dx$

14. $\int_{-1}^1 x^{100} dx$

15. $\int_1^4 (5 - 2t + 3t^2) dt$

16. $\int_0^1 (1 + \dfrac{1}{2}u^4 - \dfrac{2}{5}u^9)$

17. $\int_1^9 \sqrt{x}dx$

18. $\int_1^8 x^{-2/3}dx$

19. $\int_{\pi/6}^\pi \sin\theta d\theta$

20. $\int_{-5}^5 \pi dx$

21. $\int_0^1 (u+2)(u-3)du$

22. $\int_0^4 (4-t)\sqrt{t}dt$

23. $\int_1^9 \frac{x-1}{\sqrt{x}}dx$

24. $\int_0^2 (y-1)(2y+1)$

25. $\int_0^{\pi/4} \sec^2 t dt$

26. $\int_0^{\pi/4} \sec\theta \quad \tan\theta \quad d\theta$

27. $\int_1^2 (1+2y)^2 dy$

28. $\int_1^2 \frac{s^4+1}{s^2}ds$

29. $\int_1^2 \frac{v^5+3v^6}{v^4}dv$

30. $\int_1^{18} \sqrt{\frac{3}{z}}dz$

31. $\int_0^\pi f(x)dx \quad \text{donde} \quad f(x) = \begin{cases} \sin x & \text{si} & 0 \leq & x < \pi/2 \\ \cos x & \text{si} & \pi/2 \leq & x \leq \pi \end{cases}$

32. $\int_{-2}^2 f(x)dx \quad \text{donde} \quad f(x) = \begin{cases} 2 & \text{si} & -2 \leq & x \leq 0 \\ 4-x^2 & \text{si} & 0 < & x \leq 2 \end{cases}$

¿Qué está mal con la ecuación?

33. $\int_{-2}^1 x^{-4}dx = \frac{x^{-3}}{-3}\Big|_{-2}^1 = -\frac{3}{8}$

34. $\displaystyle\int_{-1}^{2} \frac{4}{x^3}dx = -\frac{2}{x^2}\Big|_{-1}^{2} = \frac{3}{2}$

35. $\displaystyle\int_{\pi/3}^{\pi} \sec\theta\tan\theta d\theta = \sec\theta\Big|_{\pi/3}^{\pi} = -3$

36. $\displaystyle\int_{0}^{\pi} \sec^2 x dx = \tan x\Big|_{0}^{\pi} = 0$

Use un gráfico para dar una estimación aproximada del área de la región que se encuentra debajo de la curva dada. Luego encuentra el área exacta.

37. $y = \sqrt[3]{x}, \quad 0 \leq x \leq 27$

38. $y = x^{-4}, \quad 1 \leq x \leq 6$

39. $y = \sin x, \quad 0 \leq x \leq \pi$

40. $y = \sec^2 x, \quad 0 \leq x \leq \pi/3$

Evaluar la integral.

41. $\displaystyle\int_{1}^{9} \frac{1}{2x}dx$

42. $\displaystyle\int_{0}^{1} 10^x dx$

43. $\displaystyle\int_{1/2}^{\sqrt{3/2}} \frac{6}{\sqrt{1-t^2}}dt$

44. $\displaystyle\int_{0}^{1} \frac{4}{t^2+1}dt$

45. $\displaystyle\int_{-1}^{1} e^{u+1}du$

46. $\displaystyle\int_{1}^{2} \frac{4+u^2}{u^3}du$

Verificar por diferenciación que la fórmula es correcta.

1. $\int \dfrac{1}{x^2\sqrt{1+x^2}}dx = -\dfrac{\sqrt{1+x^2}}{x} + C$

2. $\int \cos^2 x\, dx = \dfrac{1}{2}x + \dfrac{1}{4}\sin 2x + C$

3. $\int \cos^3 x\, dx = \sin x - \dfrac{1}{3}\sin^3 x + C$

4. $\int \dfrac{x}{\sqrt{a+bx}}dx = \dfrac{2}{3b^2}(bx - 2a)\sqrt{a+bx} + C$

Encuentra la integral general indefinida.

5. $\int (x^2 + x^{-2})dx$

6. $\int (\sqrt{x^3} + \sqrt[3]{x^2})dx$

7. $\int (x^4 - \dfrac{1}{2}x^3 + \dfrac{1}{4}x - 2)dx$

8. $\int (y^3 + 1.8y^2 - 2.4y)dy$

9. $\int (u+4)(2u+1)du$

10. $\int v(v^2+2)^2 dv$

11. $\int \dfrac{x^3 - 2\sqrt{x}}{x}dx$

12. $\int \left(u^2 + 1 + \dfrac{1}{u^2}\right)du$

13. $\int (\theta - \csc\theta\cot\theta)d\theta$

14. $\int \sec t(\sec t + \tan t)dt$

15. $\int (1 + \tan^2\alpha)d\alpha$

16. $\int \dfrac{\sin 2x}{\sin x}dx$

Evaluar la integral.

17. $\int_{-2}^{3} (x^2 - 3)dx$

18. $\displaystyle\int_1^2 (4x^3 - 3x^2 + 2x)dx$

19. $\displaystyle\int_{-2}^0 (\frac{1}{2}t^4 + \frac{1}{4}t^3 - t)dt$

20. $\displaystyle\int_0^3 (1 + 6w^2 - 10w^4)dw$

21. $\displaystyle\int_0^2 (2x - 3)(4x^2 + 1)dx$

22. $\displaystyle\int_{-1}^1 t(1 - t)^2 dt$

23. $\displaystyle\int_0^\pi (4\sin\theta - 3\cos\theta)d\theta$

24. $\displaystyle\int_1^2 \left(\frac{1}{x^2} - \frac{4}{x^3}\right) dx$

25. $\displaystyle\int_1^4 \left(\frac{4 + 6u}{\sqrt{u}}\right) du$

26. $\displaystyle\int_1^2 \left(x + \frac{1}{x}\right)^2 dx$

27. $\displaystyle\int_1^2 \sqrt{\frac{5}{x}}dx$

28. $\displaystyle\int_1^9 \frac{3x - 2}{\sqrt{x}}dx$

29. $\displaystyle\int_1^4 \sqrt{t}(1 + t)dt$

30. $\displaystyle\int_{\pi/4}^{\pi/3} \csc^2\theta d\theta$

31. $\displaystyle\int_0^{\pi/4} \frac{1 + \cos^2\theta}{\cos^2\theta}d\theta$

32. $\displaystyle\int_0^{\pi/3} \frac{\sin\theta + \sin\theta\tan^2\theta}{\sec^2\theta}d\theta$

33. $\displaystyle\int_1^{64} \frac{1 + \sqrt[3]{x}}{\sqrt{x}}dx$

34. $\displaystyle\int_1^8 \frac{x - 1}{\sqrt[3]{x^2}}dx$

35. $\displaystyle\int_0^1 (\sqrt[4]{x^5} + \sqrt[5]{x^4})dx$

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

37. $\int_2^5 |x - 3| dx$

38. $\int_0^2 |2x - 1| dx$

39. $\int_{-1}^2 (x - 2|x|) dx$

40. $\int_0^{3\pi/2} |\sin x| dx$

41. $\int (\sin x + \sin hx) dx$

42. $\int_{-10}^{10} \frac{2e^x}{\sinh x + \cosh x} dx$

43. $\int \left(x^2 + 1 + \frac{1}{x^2 + 1} \right) dx$

44. $\int_1^2 \frac{(x - 1)^3}{x^2} dx$

45. $\int_0^{1/\sqrt{3}} \frac{t^2 - 1}{t^4 - 1} dt$

Evalúa la integral haciendo la sustitución dada.

1. $\int \sin \pi x \, dx, \quad u = \pi x$

2. $\int x^3 (2 + x^4)^5 dx, \quad u = 2 + x^4$

3. $\int x^2 \sqrt{x^3 + 1} \, dx, \quad u = x^3 + 1$

4. $\int \frac{dt}{(1 - 6t)^4}, \quad u = 1 - 6t$

5. $\int \cos^3 \theta \sin \theta \, d\theta, \quad u = \cos \theta$

6. $\int \frac{\sec^2(1/x)}{x^2} dx, \quad u = 1/x$

Evaluar la integral indefinida.

7. $\int x \sin(x^2) dx$

8. $\int x^2 \cos(x^3) dx$

9. $\int (1-2x)^9 dx$

10. $\int (3t+2)^{2.4} dt$

11. $\int (x+1)\sqrt{2x+x^2}\,dx$

12. $\int \sec^2 2\theta\, d\theta$

13. $\int \sec 3t \tan 3t\, dt$

14. $\int u\sqrt{1-u^2}\, du$

15. $\int \dfrac{a+bx^2}{\sqrt{3ax+bx^3}}\, dx$

16. $\int \dfrac{\sin\sqrt{x}}{\sqrt{x}}\, dx$

17. $\int \sec^2\theta \tan^3\theta\, d\theta$

18. $\int \cos^4\theta \sin\theta\, d\theta$

19. $\int (x^2+1)(x^3+3x)^4\, dx$

20. $\int \sqrt{x}\sin(1+x^{3/2})\, dx$

21. $\int \dfrac{\cos x}{\sin^2 x}\, dx$

22. $\int \dfrac{\cos(\pi/x)}{x^2}\, dx$

23. $\int \dfrac{z^2}{\sqrt[3]{1+z^3}}\, dz$

24. $\int \dfrac{dt}{\cos^2 t\sqrt{1+\tan t}}$

25. $\int \sqrt{\cot x}\csc^2 x\, dx$

26. $\int \sin t \sec^2(\cos t)\, dt$

27. $\int \sec^3 x \tan x\, dx$

28. $\int x^2\sqrt{2+x}\,dx$

29. $\int x(2x+5)^8\,dx$

30. $\int x^3\sqrt{x^2+1}\,dx$

Evalúa la integral indefinida. Ilustre y compruebe que su respuesta es razonable graficando tanto la función como su antiderivada (tomar $C=0$).

31. $\int x(x^2-1)^3\,dx$

32. $\int \tan^2\theta\sec^2\theta\,d\theta$

33. $\int \sin^3 x\cos x\,dx$

34. $\int \sin x\cos^4 x\,dx$

Evaluar la integral definida.

35. $\int_0^1 \cos(\pi t/2)\,dt$

36. $\int_0^1 (3t-1)^{50}\,dt$

37. $\int_0^1 \sqrt[3]{1+7x}\,dx$

38. $\int_0^{\sqrt{\pi}} x\cos(x^2)\,dx$

39. $\int_0^{\pi} \sec^2(t/4)\,dt$

40. $\int_{1/6}^{1/2} \csc\pi t\cot\pi t\,dt$

41. $\int_{-\pi/4}^{\pi/4} (x^3+x^4\tan x)\,dx$

42. $\int_0^{\pi/2} \cos x\sin(\sin x)\,dx$

43. $\int_0^{13} \frac{dx}{\sqrt[3]{(1+2x)^2}}$

44. $\int_0^a x\sqrt{a^2-x^2}\,dx$

45. $\displaystyle\int_0^a x\sqrt{x^2 + a^2}dx \quad (a > 0)$

46. $\displaystyle\int_{-\pi/3}^{\pi/3} x^4 \sin x dx$

47. $\displaystyle\int_1^2 x\sqrt{x - 1}dx$

48. $\displaystyle\int_0^4 \frac{x}{\sqrt{1 + 2x}}dx$

49. $\displaystyle\int_{1/2}^1 \frac{\cos(x^{-2})}{x^3}dx$

50. $\displaystyle\int_0^{T/2} \sin(2\pi t/T - \alpha)dt$

51. $\displaystyle\int_0^1 \frac{dx}{(1 + \sqrt{x})^4}$

Evaluar la integral.

52. $\displaystyle\int \frac{dx}{5 - 3x}$

53. $\displaystyle\int e^x \sin(e^x)dx$

54. $\displaystyle\int \frac{(\ln x)^2}{x}dx$

55. $\displaystyle\int \frac{dx}{ax + b}(a \neq 0)$

56. $\displaystyle\int e^{\tan x} \sec^2 x dx$

57. $\displaystyle\int e^{\cos t} \sin t dt$

58. $\displaystyle\int e^{\tan x} \sec^2 x dx$

59. $\displaystyle\int \frac{\tan^{-1} x}{1 + x^2}dx$

60. $\displaystyle\int \frac{1 + x}{1 + x^2}dx$

61. $\displaystyle\int \frac{\sin(\ln x)}{x}dx$

62. $\displaystyle\int \frac{\sin 2x}{1 + \cos^2 x}dx$

63. $\displaystyle\int \frac{\sin 2x}{1+cos2x}dx$

64. $\displaystyle\int \frac{\sin x}{1+\cos^2 x}dx$

65. $\displaystyle\int \cot x\, dx$

66. $\displaystyle\int \frac{\sin x}{1+\cos^2 x}dx$

67. $\displaystyle\int_e^{e4} \frac{dx}{x\sqrt{\ln x}}$

68. $\displaystyle\int_0^1 xe^{-x^2}dx$

69. $\displaystyle\int_0^1 \frac{e^z+1}{e^z+z}dz$

70. $\displaystyle\int_0^{1/2} \frac{\sin^{-1}}{\sqrt{1-x^2}}dx$

71. $\displaystyle\int_1^2 (8x^3+3x^2)dx$

72. $\displaystyle\int_0^T (x^4-8x+7)dx$

73. $\displaystyle\int_0^1 (1-x^9)dx$

74. $\displaystyle\int_0^1 (\sqrt[4]{u}+1)^2 du$

75. $\displaystyle\int_0^1 y(y^2+1)^5 dy$

76. $\displaystyle\int_0^2 y^2\sqrt{1+y^3}dy$

77. $\displaystyle\int_1^5 \frac{dt}{(t-4)^2}$

78. $\displaystyle\int_0^1 \sin(3\pi t)dt$

79. $\displaystyle\int_0^1 v^2\cos(v^3)dv$

80. $\displaystyle\int_{-1}^1 \frac{\sin x}{1+x^2}dx$

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81. $\displaystyle\int_{-\pi/4}^{\pi/4} \frac{t^4 \tan t}{2 + \cos t} dt$

82. $\displaystyle\int \frac{x + 2}{\sqrt{x^2 + 4x}} dx$

83. $\displaystyle\int \sin \pi t \cos \pi t\, dt$

84. $\displaystyle\int \sin x \cos(\cos x) dx$

85. $\displaystyle\int_0^{\pi/8} \sec 2\theta \tan 2\theta\, d\theta$

86. $\displaystyle\int_0^{\pi/4} (1 + \tan t)^3 \sec^2 t\, dt$

87. $\displaystyle\int_0^3 |x^2 - 4|\, dx$

88. $\displaystyle\int_0^4 |\sqrt{x} - 1|\, dx$

Encuentra la derivada de la función.

89. $\displaystyle F(x) = \int_0^x \frac{t^2}{1 + t^3} dt$

90. $\displaystyle F(x) = \int_x^1 \sqrt{t + \sin t}\, dt$

91. $\displaystyle g(x) = \int_0^{x^4} \cos(t^2) dt$

92. $\displaystyle g(x) = \int_1^{\sin x} \frac{1 - t^2}{1 + t^4} dt$

93. $\displaystyle y = \int_{\sqrt{x}}^x \frac{\cos \theta}{\theta} d\theta$

94. $\displaystyle y = \int_{2x}^{3x+1} \sin(t^4) dt$

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1. $\int \dfrac{\sqrt[5]{x^3} + \sqrt[6]{x}}{\sqrt{x}} dx.$

2. $\int \dfrac{dx}{\sqrt{x-1} + \sqrt{x+1}}.$

3. $\int \dfrac{e^x + e^{2x} + e^{3x}}{e^{4x}} dx.$

4. $\int \dfrac{a^x}{b^x} dx.$

5. $\int tg^2 x dx.$

6. $\int \dfrac{dx}{a^2 + x^2}.$

7. $\int \dfrac{dx}{\sqrt{a^2 - x^2}}.$

8. $\int \dfrac{dx}{1 + senx}.$

9. $\int \dfrac{8x^2 + 6x + 4}{x + 1} dx.$

10. $\int \dfrac{1}{\sqrt{2x - x^2}} dx.$

11. $\int e^x \operatorname{sen} e^x dx.$

12. $\int x e^{-x^2} dx.$

13. $\int \dfrac{logx}{x} dx.$

14. $\int \dfrac{e^x dx}{e^{2x} + 2e^x + 1}.$

15. $\int e^{x^2} e^x dx.$

16. $\int \dfrac{xdx}{\sqrt{1 - x^4}}.$

17. $\int \dfrac{e^{\sqrt{x}}}{\sqrt{x}} dx.$

18. $\int x\sqrt{1 - x^2} dx.$

19. $\int log(\cos x) tgx dx.$

20. $\int \frac{log(logx)}{xlogx} dx.$

21. $\int x^2 e^x dx.$

22. $\int x^3 e^{x^2} dx.$

23. $\int e^{ax} senbx dx.$

24. $\int x^2 senx dx.$

25. $\int (logx)^3 dx.$

26. $\int \frac{log(logx)}{x} dx.$

27. $\int sec^3 x dx.$

28. $\int \cos(logx) dx.$

29. $\int \sqrt{x} logx dx.$

30. $\int x(logx)^2 dx.$

31. $\int \frac{dx}{\sqrt{1-x^2}}.$

32. $\int \frac{dx}{\sqrt{1+x^2}}.$

33. $\int \frac{dx}{\sqrt{x^2-1}}.$

34. $\int \frac{dx}{x\sqrt{x^2-1}}.$

35. $\int \frac{dx}{x\sqrt{1-x^2}}.$

36. $\int \frac{dx}{x\sqrt{1+x^2}}.$

37. $\int x^2\sqrt{1-x^2} dx.$

38. $\int \sqrt{1-x^2}dx.$

39. $\int \sqrt{1+x^2}dx.$

40. $\int \sqrt{x^2-1}dx.$

41. $\int \dfrac{dx}{1+\sqrt{x+1}}.$

42. $\int \dfrac{dx}{1+e^x}.$

43. $\int \dfrac{dx}{\sqrt{x}+\sqrt[3]{x}}.$

44. $\int \dfrac{dx}{\sqrt{1+e^x}}.$

45. $\int \dfrac{dx}{2+tgx}.$

46. $\int \dfrac{dx}{\sqrt{\sqrt{x+1}}}.$

47. $\int \dfrac{4^x+1}{2^x+1}dx.$

48. $\int e\sqrt{x}dx.$

49. $\int \dfrac{\sqrt{1-x}}{1-\sqrt{x}}dx.$

50. $\int \sqrt{\dfrac{x-1}{x+1}}.\dfrac{1}{x^2}dx.$

51. $\int \dfrac{2x^2+7x-1}{x^3+x^2-x-1}dx.$

52. $\int \dfrac{2x+1}{x^3-3x^2+3x-1}dx.$

53. $\int \dfrac{x^3+7x^2-5x+5}{(x-1)^2(x+1)^3}dx.$

54. $\int \dfrac{2x^2+x+1}{(x+3)(x-1)^2}dx.$

55. $\int \dfrac{x+4}{x^2+1}dx.$

56. $\displaystyle\int \frac{x^3 + x + 2}{x^4 + 2x^2 + 1}dx.$

57. $\displaystyle\int \frac{3x^2 + 3x + 1}{x^3 + 2x^2 + 2x + 1}dx.$

58. $\displaystyle\int \frac{dx}{x^4 + 1}.$

59. $\displaystyle\int \frac{2x}{(x^2 + x + 1)^3}dx.$

60. $\displaystyle\int \frac{3x}{(x2 + x + 1)^3}dx.$

61. $\displaystyle\int \frac{\text{arctg x}}{1 + x^2}dx.$

62. $\displaystyle\int \frac{x\text{arctg x}}{(1 + x^2)^3}.$

63. $\displaystyle\int \log\sqrt{1 + x^2}dx.$

64. $\displaystyle\int xlog\sqrt{1 + x^2}dx.$

65. $\displaystyle\int \frac{x^2 - 1}{x^2 + 1} \cdot \frac{1}{\sqrt{1 + x^4}}dx.$

66. $\displaystyle\int \text{arcsen}\sqrt{x}dx.$

67. $\displaystyle\int \frac{x}{1 + senx}dx.$

68. $\displaystyle\int e^{senx} \cdot \frac{xcos^3x - senx}{cos^2x}dx.$

69. $\displaystyle\int \sqrt{tgx}dx.$

70. $\displaystyle\int \frac{dx}{x^6 + 1}.$

71. $\displaystyle\int \log(a^2 + x^2)dx.$

72. $\displaystyle\int \frac{1 + cosx}{sen^2x}dx.$

73. $\displaystyle\int \frac{x + 1}{\sqrt{4 - x^2}}dx.$

74. $\int x \text{arctg } x dx.$

75. $\int sen^3 x dx.$

76. $\int \dfrac{sen^3 x}{cos^2 x} dx.$

77. $\int x^2 \text{arctg } x dx.$

78. $\int \dfrac{x dx}{\sqrt{x^2 - 2x + 2}}.$

79. $\int sec^3 x \quad tg \quad x \quad dx.$

80. $\int x \quad tg^2 \quad x \quad dx.$

81. $\int \dfrac{dx}{(a^2 + x2)^2}$

82. $\int \sqrt{1 - senx} dx.$

83. $\int \text{arctg} \sqrt{x} dx.$

84. $\int sen \sqrt{x + 1} dx.$

85. $\int \dfrac{\sqrt{x^3 - 2}}{x} dx.$

86. $\int log(x + \sqrt{x^2 - 1}) dx.$

87. $\int log(x + \sqrt{x}) dx.$

88. $\int \dfrac{dx}{x - x^{3/5}}.$

89. $\int \dfrac{dx}{1 + senx}.$

90. $\int \dfrac{dx}{3 + 5senx}.$

Evaluar la integral utilizando la integración por partes con las elecciones indicadas de u y dv.

1. $\int x \ln x dx; \quad u = \ln x, \quad dv = x dx$

2. $\int \theta \sec^2 \theta d\theta; \quad u = \theta, \quad dv = \sec^2 \theta d\theta$

Evaluar la integral

3. $\int x \cos 5x dx$

4. $\int x e^{-x} dx$

5. $\int r e^{r/2} dr$

6. $\int t \sin 2t dt$

7. $\int x^2 \sin \pi x dx$

8. $\int x^2 \cos mx dx$

9. $\int \ln(2x + 1) dx$

10. $\int \sin^{-1} x dx$

11. $\int \text{arc} \tan 4t dt$

12. $\int p^5 \ln p dp$

13. $\int (\ln x^2) dx$

14. $\int t^3 e^t dt$

15. $\int e^{2\theta} \sin 3\theta d\theta$

16. $\int e^{\theta} \cos 2\theta d\theta$

17. $\int y \sinh y dy$

18. $\int y \cosh ay dy$

19. $\int_0^{\pi} t \sin 3t dt$

20. $\int_0^1 (x^2 + 1) e^{-x} dx$

21. $\displaystyle\int_1^2 \frac{\ln x}{x^2}dx$

22. $\displaystyle\int_1^4 \sqrt{t}\ln t\, dt$

23. $\displaystyle\int_0^1 \frac{y}{e^{2y}}dy$

24. $\displaystyle\int_{\pi/4}^{\pi/2} x\csc^2 x\, dx$

25. $\displaystyle\int_0^{1/2} \cos^{-1} x\, dx$

26. $\displaystyle\int_0^1 x5^x dx$

27. $\displaystyle\int \cos x\ln(\sin x)dx$

28. $\displaystyle\int_1^{\sqrt{3}} \arctan(1/x)dx$

29. $\displaystyle\int \cos(\ln x)dx$

30. $\displaystyle\int_0^1 \frac{r^3}{\sqrt{4+r^2}}dr$

31. $\displaystyle\int_1^2 x^4(\ln x)^2 dx$

32. $\displaystyle\int_0^t e^s \sin(t-s)ds$

Primero realice una sustitución y luego use la integración por partes para evaluar la integral.

33. $\displaystyle\int \sin\sqrt{x}\, dx$

34. $\displaystyle\int_1^4 e^{\sqrt{x}}dx$

35. $\displaystyle\int_{\sqrt{\pi/2}}^{\sqrt{\pi}} \theta^3 \cos(\theta^2)d\theta$

36. $\displaystyle\int x^5 e^{x^2}dx$

37. $\displaystyle\int x\cos\pi x\, dx$

38. $\displaystyle\int x^{3/2}\ln x\, dx$

39. $\displaystyle\int (2x+3)e^x dx$

40. $\displaystyle\int x^3 e^{x^2} dx$

41.

  a. Demuestre que:

$$\int \sin^2 x\, dx = \frac{x}{2} - \frac{\sin 2x}{4} + C$$

  b. Use la parte (a) y la fórmula de reducción para evaluar $\displaystyle\int \sin^4 x\, dx$.

42.

  a. Demuestre la fórmula de reducción

$$\int \cos^n x\, dx = \frac{1}{n}\cos^{n-1} x \sin x + \frac{n-1}{n}\int \cos^{n-2} x\, dx$$

  b. Use la parte (a) para evaluar $\displaystyle\int \cos^2 x\, dx$.

  c. Use las partes (a) y (b) para evaluar $\displaystyle\int \cos^4 x\, dx$.

43.

  a. Demuestre que:

$$\int_0^{\pi/2} \sin^n x\, dx = \frac{n-1}{n}\int_0^{\pi/2} \sin^{n-2} x\, dx$$

Cuando $n \geq 2$ es un numero entero.

  b. Use la parte (a) para evaluar, $\displaystyle\int_0^{\pi/2} \sin^3 x\, dx \quad y \quad \int_0^{\pi/2} \sin^5 dx$.

  c. Use la parte (a) para mostrar que, para las potencias impares del seno,

$$\int_0^{\pi/2} \sin^{2n+1} x\, dx = \frac{2.4.6.....2n}{3.5.7.....(2n+1)}$$

44. Demuestre que, incluso para las potencias del seno:

$$\int_0^{\pi/2} \sin^{2n} x\, dx = \frac{1.3.5.....(2n-1)}{2.4.6.....2n}\frac{\pi}{2}$$

Use la integración por partes para probar la fórmula de reducción

45. $\displaystyle\int (\ln x)^n dx = x(\ln x)^n - n\int (\ln x)^{n-1} dx$

46. $\int x^n e^x dx = x^n e^x - n \int x^{n-1} e^x dx$

47. $\int (x^2 + a^2)^n dx = \dfrac{x(x^2 + a^2)^n}{2n+1} + \dfrac{2na^2}{2n+1} \int (x^2 + a^2)^{n-1} dx \quad (n \neq -\dfrac{1}{2})$

48. $\int \sec^n x dx = \dfrac{\tan x \sec^{n-2} x}{n-1} + \dfrac{n-1}{n-1} \int \sec^{n-2} x dx \quad (n \neq 1)$

49. Usa el ejercicio 45 para encontrar $\int (\ln x)^3 dx$.

50. Usa el ejercicio 46 para encontrar $\int x^4 e^x dx$.

Encuentra el área de la región delimitada por las curvas dadas.

51. $y = xe^{-0,4x}, \quad y = 0, \quad x = 5$

52. $y = 5 \ln x, \quad y = x \ln x$

Integrales trigonométricas

Evaluar la integral.

1. $\int \sin^3 x \cos^2 x\, dx$

2. $\int \sin^6 x \cos^3 x\, dx$

3. $\int\_\pi/2^{3\pi/4} \sin^5 x \cos^3 x\, dx$

4. $\int_0^{\pi/2} \cos^5 x\, dx$

5. $\int \cos^5 x \sin^4 x\, dx$

6. $\int$
   $sin^3(mx)\, dx$

7. $\int_0^{\pi/2} \cos^2 \theta\, d\theta$

8. $\int_0^{\pi/2} \sin^2(2\theta)\, d\theta$

9. $\int_0^{\pi} \sin^4(3t)\, dt$

10. $\int_0^{\pi} \cos^6 \theta\, d\theta$

11. $\int (1 + \cos \theta)^2\, d\theta$

12. $\int x \cos^2 x\, dx$

13. $\int_0^{\pi/4} \sin^4 x cos^2 x\, dx$

14. $\int_0^{\pi/2} \sin^2 x \cos^2 x\, dx$

15. $\int \sin^3 x \sqrt{\cos x}\, dx$

16. $\int \cos \theta \cos^5(sin\theta)\, d\theta$

17. $\int \cos^2 x \tan^3 x\, dx$

18. $\int \cot^5 \theta \sin^4 \theta\, d\theta$

19. $\int \dfrac{1 - \sin x}{\cos x} dx$

20. $\int \cos^2 x \sin 2x dx$

21. $\int \sec^2 x \tan x dx$

22. $\int_0^{\pi/2} \sec^4(t/2) dt$

23. $\int \tan^2 x dx$

24. $\int \tan^4 x dx$

25. $\int \sec^6 t dt$

26. $\int_0^{\pi/4} \sec^4 \theta \tan^4 \theta d\theta$

27. $\int_0^{\pi/3} \tan^5 \sec^4 x dx$

28. $\int \tan^3(2x) \sec^5(2x) dx$

29. $\int \tan^3 \sec x dx$

30. $\int_0^{\pi/3} \tan^5 x \sec^6 x dx$

31. $\int \tan^5 x dx$

32. $\int \tan^6(ay) dy$

33. $\int \dfrac{\tan^3 \theta}{\cos^4 \theta} d\theta$

34. $\int \tan^2 x \sec x dx$

35. $\int_{\pi/6}^{\pi/2} \cot^2 x dx$

36. $\int_{\pi/4}^{\pi/2} \cot^3 x dx$

37. $\int \cot^3 \alpha \csc^3 \alpha d\alpha$

38. $\int \csc^4 x \cot^5 x dx$

39. $\int \csc x dx$

40. $\int_{\pi/6}^{\pi/3} \csc^3 x dx$

41. $\int \sin 5x \sin 2x dx$

42. $\int \sin 3x \cos x dx$

43. $\int \cos 7\theta \cos 5\theta d\theta$

44. $\int \dfrac{\cos x + \sin x}{\sin 2x} dx$

45. $\int \dfrac{1 - \tan^2 x}{\sec^2 x} dx$

46. $\int \dfrac{dx}{\cos x - 1}$

47. $\int t \sec^2(t^2) \tan^4(t^2) dt$

48. Si $\int_0^{\pi/4} \tan^6 x \sec x dx = I$ exprese el valor de $\int_0^{\pi/4} \tan^8 x \sec x dx$ en terminos de I.

Evalúa la integral indefinida. Ilustre y compruebe que su respuesta es razonable, graficando tanto el integrando como su antiderivada (tomando $C = 0$)

49. $\int \sin^5 x dx$

50. $\int \sin^4 x \cos^4 x dx$

51. $\int \sin 3x \sin 6x dx$

52. $\int \sec^4 \dfrac{x}{2} dx$

Evaluar la integral usando la sustitución trigonométrica indicada. Dibuje y etiquete el triángulo rectángulo asociado.

1. $\int \dfrac{1}{x^2\sqrt{x^2 - 9}} dx; \quad x = 3\sec\theta$

2. $\int x^3\sqrt{9 - x^2} dx; \quad x = 3\sin\theta$

3. $\displaystyle\int \frac{x^3}{\sqrt{x^2+9}}dx; \quad x = 3\tan\theta$

4. $\displaystyle\int_0^{2\sqrt{3}} \frac{x^3}{\sqrt{16-x^2}}dx$

5. $\displaystyle\int_{\sqrt{2}}^2 \frac{1}{t^3\sqrt{t^2-1}}dt$

6. $\displaystyle\int_0^2 x^3\sqrt{x^2+4}\,dx$

7. $\displaystyle\int \frac{1}{x^2\sqrt{25-x^2}}dx$

8. $\displaystyle\int \frac{\sqrt{x^2-a^2}}{x^4}dx$

9. $\displaystyle\int \frac{dx}{\sqrt{x^2+16}}$

10. $\displaystyle\int \frac{t^5}{\sqrt{t^2+2}}dt$

11. $\displaystyle\int \sqrt{1-4x^2}\,dx$

12. $\displaystyle\int_0^1 x\sqrt{x^2+4}\,dx$

13. $\displaystyle\int \frac{x^2-9}{x^3}dx$

14. $\displaystyle\int \frac{du}{u\sqrt{5-u^2}}$

15. $\displaystyle\int \frac{x^2}{(a^2-x^2)^{3/2}}dx$

16. $\displaystyle\int \frac{dx}{x^2\sqrt{16x^2-9}}$

17. $\displaystyle\int \frac{x}{\sqrt{x^2-7}}dx$

18. $\displaystyle\int \frac{dx}{[(ax)^2-b^2]^{3/2}}$

19. $\displaystyle\int \frac{\sqrt{1+x^2}}{x}dx$

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20. $\displaystyle\int \frac{t}{\sqrt{25 - t^2}}dt$

21. $\displaystyle\int_0^{2/3} x^3\sqrt{4 - 9x^2}dx$

22. $\displaystyle\int_0^1 \sqrt{x^2 + 1}dx$

23. $\displaystyle\int \sqrt{5 + 4x - x^2}dx$

24. $\displaystyle\int \frac{dt}{\sqrt{t^2 - 6t + 13}}$

25. $\displaystyle\int \frac{1}{\sqrt{9x^2 + 6x - 8}}dx$

26. $\displaystyle\int \frac{x2}{\sqrt{4x - x^2}}dx$

27. $\displaystyle\int \frac{dx}{(x2^+2x + 2)^2}$

28. $\displaystyle\int \frac{dx}{(5 - 4x - x^2)^{5/2}}$

29. $\displaystyle\int x\sqrt{1 - x^4}dx$

30. $\displaystyle\int_0^{\pi/2} \frac{\sqrt{\cos t}}{\sqrt{1 + \sin^2 t}}dt$

31.

   a) Use la sustitución trigonométrica para mostrar que

$$\int \frac{dx}{\sqrt{x^2 + a^2}} = \ln(x + \sqrt{x^2 + a^2}) + C$$

b)Usa la sustitución hiperbólica $x = a\sin ht$ para mostrar que

$$\int \frac{dx}{\sqrt{x^2 + a^2}} = \sin h^{-1}\left(\frac{x}{a}\right) + C$$