PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE
FACULTAD DE MATEMATICAS
DEPARTAMENTO DE MATEMATICA
TAV 2023.

MAT 1610. Integrales para practicar.

1. Hallar en cada caso la primitiva de la función.

1. – $\int (5x-1)^{25}\, dx$
2. – $\int x^4 \ln(x)\, dx$
3. – $\int \frac{x^4+x^2+1}{x^2}\, dx$
4. – $\int \sqrt{1+x^2}\, dx$
5. – $\int \frac{\operatorname{sen}(x)}{3+\cos(x)}\, dx$
6. – $\int \frac{5}{(x-1)(x+3)}\, dx$
7. – $\int \left(5\, e^{2x} - e^{-2x}\right)\, dx$
8. – $\int x^2\, e^x\, dx$
9. – $\int \csc(x)\, dx$
10. – $\int \frac{\cos(x)-1}{\operatorname{sen}(x)-x}\, dx$
11. – $\int \frac{3}{x^2-9}\, dx$
12. – $\int \frac{1}{x^2\sqrt{x^2-25}}\, dx$
13. – $\int \frac{1}{x+x^3}\, dx$
14. – $\int \frac{4x-3}{x^2-x}\, dx$
15. – $\int \frac{\cos(x)-\operatorname{sen}(x)}{\operatorname{sen}(x)+\cos(x)-1}\, dx$
16. – $\int \left(\frac{6}{x^3} - 2x^{3/5}\right)\, dx$
17. – $\int \frac{e^{1/x}}{x^2}\, dx$
18. – $\int e^{-x} \operatorname{sen}(x)\, dx$
19. – $\int \frac{1}{(a^2-x^2)^{3/2}}\, dx$
20. – $\int \operatorname{sen}^3(x)\cos(x)\, dx$
21. – $\int x \ln(x^2)\, dx$
22. – $\int (510\, x - 23x^7)\, dx$
23. – $\int \frac{x-1}{x^2-2x-2}\, dx$
24. – $\int \frac{\operatorname{sen}(2x)}{1+cos^2(x)}\, dx$
25. – $\int (3x+1)^4\, dx$
26. – $\int \frac{\operatorname{sen}(x)}{\cos^2(x)+1}\, dx$
27. – $\int x\,(2x^2-3)^6\, dx$
28. – $\int x^2\sqrt{x^3-1}\, dx$
29. – $\int \sqrt{9-x^2}\, dx$
30. – $\int \frac{1}{\sqrt{x}\,(1+x)}\, dx$
31. – $\int \frac{e^x}{\sqrt{16-e^{2x}}}\, dx$
32. – $\int \frac{x-2}{(x^2-4x+3)^3}\, dx$
33. – $\int \frac{x}{\sqrt[4]{1-2x^2}}\, dx$
34. – $\int \frac{1}{x\sqrt{x^6-4}}\, dx$
35. – $\int \frac{(\sqrt{x}+3)^4}{\sqrt{x}}\, dx$
36. – $\int \left(1+\frac{1}{x}\right)^{-3} \frac{1}{x^2}\, dx$

40. – $\int x\sqrt{8x+5}\,dx$

41. – $\int \frac{6}{\sqrt{5-6x}}\,dx$

42. – $\int \frac{\cos(x)}{\sqrt{9-\operatorname{sen}^2(x)}}\,dx$

43. – $\int \frac{1}{\sqrt{e^{2x}-25}}\,dx$

44. – $\int \frac{x^2}{(x^3-2)^2}\,dx$

45. – $\int (x^3+1)^2\,dx$

46. – $\int \frac{1}{e^x\sqrt{1-e^{-2x}}}\,dx$

47. – $\int (x+e^{5x})^2\,dx$

48. – $\int \frac{\sec(x)\tan(x)}{1+\sec^3(x)}\,dx$

49. – $\int \frac{\ln(\ln(x))}{x}\,dx$

50. – $\int \frac{1}{x\,(\ln(x))^2}\,dx$

51. – $\int \frac{x}{\sqrt{36-x^2}}\,dx$

52. – $\int \frac{1}{x\sqrt{x-1}}\,dx$

53. – $\int \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$

54. – $\int x\,e^{x^2}\,dx$

55. – $\int \frac{e^x}{\sqrt{4-e^x}}\,dx$

56. – $\int \frac{(e^x+1)^2}{e^x}\,dx$

57. – $\int \frac{e^x}{e^x+1}\,dx$

58. – $\int \frac{e^x-e^{-x}}{e^x+e^{-x}}\,dx$

59. – $\int \frac{e^x}{(e^x+1)^2}\,dx$

60. – $\int \frac{1}{x^2+2x+1}\,dx$

61. – $\int \frac{(x^2-4)^2}{2x}\,dx$

62. – $\int \frac{x^2+3x+1}{x}\,dx$

63. – $\int x\,e^{-x}\,dx$

64. – $\int x\,\operatorname{sen}(x)\,dx$

65. – $\int \cos^3(x)\,dx$

66. – $\int \operatorname{sen}^2(2x)\,dx$

67. – $\int x^2\,e^{3x}\,dx$

68. – $\int \cos^2(x)\,\operatorname{sen}^2(x)\,dx$

69. – $\int \cos^7(x)\,dx$

70. – $\int \operatorname{sen}^6(x)\,dx$

71. – $\int \cos^3(x)\,\operatorname{sen}^3(x)\,dx$

72. – $\int x^2\cos(x)\,dx$

73. – $\int \operatorname{sen}(5x)\,\operatorname{sen}(3x)\,dx$

74. – $\int \arcsin(x)\,dx$

75. – $\int \sqrt{x}\,\ln(x)\,dx$

76. – $\int x^2\,\ln(x)\,dx$

77. – $\int x\,\csc^2(x)\,dx$

78. – $\int x\,\arctan(x)\,dx$

79. – $\int e^{-x}\,\operatorname{sen}(x)\,dx$

80. – $\int \operatorname{sen}(x)\,\ln(\cos(x))\,dx$

81. – $\int x^3\,e^{x^3}\,dx$

82. – $\int \frac{x^2}{(x^2+1)(x-1)}\,dx$

83. – $\int \frac{1}{x^3-1}\,dx$

84. – $\int \frac{2x+5}{(x^2+1)(x^2-x)}\,dx$

2. Calcular en cada caso la integral definida.

1. – $\displaystyle\int_1^5 \left(7x^2 - x\right)\, dx$

2. – $\displaystyle\int_0^4 \frac{1}{x^2+16}\, dx$

3. – $\displaystyle\int_0^{1/2} \arctan(2x)\, dx$

4. – $\displaystyle\int_0^1 \frac{(x^3+3x)}{x^2+1}\, dx$

5. – $\displaystyle\int_0^{\pi} \frac{\operatorname{sen}(2x)}{2+\cos(x)}\, dx$

6. – $\displaystyle\int_1^2 3\left(1+x^6\right)x^5\, dx$

7. – $\displaystyle\int_2^3 \ln^2(x)\, dx$

8. – $\displaystyle\int_0^{\pi/2} \frac{\cos(x)}{3+\operatorname{sen}(x)}\, dx$

9. – $\displaystyle\int_{a/2}^{a} \frac{\sqrt{a^2-x^2}}{x^2}\, dx$

10. – $\displaystyle\int_0^1 \frac{\arctan(x)}{x^2}\, dx$

11. – $\displaystyle\int_1^2 \sqrt{2-x}\, dx$

12. – $\displaystyle\int_{-4/3}^{-2/3} \frac{1}{x^2\sqrt{9-4\,x^2}}\, dx$

13. – $\displaystyle\int_0^1 \frac{1}{(3-2x)^2}\, dx$

14. – $\displaystyle\int_0^4 \frac{x}{\sqrt{x^2+9}}\, dx$

15. – $\displaystyle\int_1^4 \frac{1}{\sqrt{x}\,(1+\sqrt{x})^3}\, dx$

16. – $\displaystyle\int_{-2}^1 \frac{1}{2x+7}\, dx$

17. – $\displaystyle\int_{-1}^0 \frac{1}{4-5x}\, dx$

18. – $\displaystyle\int_0^4 \frac{1}{x^2+16}\, dx$

19. – $\displaystyle\int_0^{\sqrt{2}/2} \frac{x}{\sqrt{1-x^4}}\, dx$

20. – $\displaystyle\int_0^1 x^3\, e^{x^2}\, dx$

21. – $\displaystyle\int_0^{\pi/2} x\, \operatorname{sen}(2x)\, dx$

22. – $\displaystyle\int_0^1 \frac{x^3}{\sqrt{x^2+1}}\, dx$

23. – $\displaystyle\int_{\pi/2}^{\pi} \frac{1}{4-4\cos(x)}\, dx$

24. – $\displaystyle\int_0^{\pi/4} \frac{1}{5\cos(x)}\, dx$

3. Calcule las integrales, haciendo la sustitución que se indica:

a) $\displaystyle\int \frac{dx}{x\sqrt{1+x+x^2}}$ Haga $x = \dfrac{1}{y}$

b) $\displaystyle\int_0^1 \frac{dx}{e^x+e^{-x}}$ Haga $e^x = z$

c) $\displaystyle\int \frac{dx}{sen^2x+cos^2x}$ Haga $w = tg\,x$

d) $\displaystyle\int_0^1 \sqrt{2x+x^2}\,dx$ Haga $x+1 = w$

e) $\displaystyle\int_0^1 \frac{dx}{(1+x)^{3/2}+(1+x)^{1/2}}$ Haga $1+x = v$

4. Sea f una función tal que:

$$f'(x) = \frac{cosx}{x} \quad , \quad f(\pi/2) = a \quad , \quad f(3\pi/2) = b$$

Usando integración por partes, calcule $\displaystyle\int_{\pi/2}^{3\pi/2} f(x)\,dx$.

5. Si f es una función derivable y $g = f^{-1}$, demuestre que:

$$\int_a^b f^2(x)\,dx = b^2\,f^2(b) - a^2\,f^2(a) - 2\int_{f(a)}^{f(b)} y\;g(y)\,dy$$