Integral Table

1. $\int (f(x)+g(x))dx = \int f(x)dx + \int g(x)dx$

2. $\int (f(x)-g(x))dx = \int f(x)dx - \int g(x)dx$

3. $\int f(x)dg(x) = f(x)g(x) - \int g(x)df(x)$

4. $\int a^x dx = \frac{a^x}{\ln a} + C, \quad a \neq 1, \quad a > 0$

5. $\int x^n dx = \frac{x^{n+1}}{n+1} + C, \quad n \neq -1$

6. $\int \frac{1}{x} dx = \ln|x| + C$

7. $\int e^x dx = e^x + C$

8. $\int \sin x dx = -\cos x + C$

9. $\int \cos x dx = \sin x + C$

10. $\int \sec^2 x dx = \tan x + C$

11. $\int \csc^2 x dx = -\cot x + C$

12. $\int \sec x \tan x dx = \sec x + C$

13. $\int \csc x \cot x dx = -\csc x + C$

14. $\int (ax+b)^n dx = \frac{(ax+b)^{n+1}}{a(n+1)} + C, \quad a \neq 0, \quad n \neq -1$

15. $\int (ax+b)^{-1} dx = \frac{1}{a}\ln|ax+b| + C, \quad a \neq 0$

16. $\int x(ax+b)^n dx = \frac{(ax+b)^{n+1}}{a^2}\left(\frac{ax+b}{n+2} - \frac{b}{n+1}\right) + C, \quad a \neq 0, \quad n \neq -1, -2$

17. $\int x(ax+b)^{-1} dx = \frac{x}{a} - \frac{b}{a^2}\ln|ax+b| + C, \quad a \neq 0$

18. $\int x(ax+b)^{-2} dx = \frac{1}{a^2}\left(\ln|ax+b| + \frac{b}{ax+b}\right) + C, \quad a \neq 0$

19. $\int \frac{dx}{x(ax+b)} = \frac{1}{b}\ln\left|\frac{x}{ax+b}\right| + C, \quad b \neq 0$

20. $\int (\sqrt{ax+b})^n dx = \frac{2(\sqrt{ax+b})^{n+2}}{a(n+2)} + C, \quad a \neq 0, \quad n \neq -2$

21. $\int \frac{\sqrt{ax+b}}{x} dx = 2\sqrt{ax+b} + b\int \frac{dx}{x\sqrt{ax+b}}$

22. $\int \frac{dx}{x\sqrt{ax+b}} = \frac{2}{\sqrt{|b|}} \tan^{-1} \sqrt{\frac{ax+b}{|b|}} + C, \quad b < 0$

23. $\int \frac{dx}{x\sqrt{ax+b}} = \frac{1}{\sqrt{b}}\ln\left|\frac{\sqrt{ax+b}-\sqrt{b}}{\sqrt{ax+b}+\sqrt{b}}\right| + C, \quad b > 0$

24. $\int \frac{\sqrt{ax+b}}{x^2} dx = -\frac{\sqrt{ax+b}}{x} + \frac{a}{2}\int \frac{dx}{x\sqrt{ax+b}} + C$

25. $\int \frac{dx}{x^2\sqrt{ax+b}} = -\frac{\sqrt{ax+b}}{bx} - \frac{a}{2b}\int \frac{dx}{x\sqrt{ax+b}} + C, \quad b \neq 0$

26. $\int \frac{dx}{a^2+x^2} = \frac{1}{a}\tan^{-1}\frac{x}{a} + C, \quad a \neq 0$

27. $\int \frac{dx}{(a^2+x^2)^2} = \frac{x}{2a^2(a^2+x^2)} + \frac{1}{2a^3}\tan^{-1}\frac{x}{a} + C, \quad a \neq 0$

28. $\int \frac{dx}{a^2-x^2} = \frac{1}{2a}\ln\left|\frac{x+a}{x-a}\right| + C, \quad a \neq 0$

29. $\int \frac{dx}{(a^2-x^2)^2} = \frac{x}{2a^2(a^2-x^2)} + \frac{1}{2a^2}\int \frac{dx}{a^2-x^2}, \quad a \neq 0$

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

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

32. $\int x^2\sqrt{a^2+x^2}\,dx = \frac{x}{8}(a^2+2x^2)\sqrt{a^2+x^2} - \frac{a^4}{8}\ln(x+\sqrt{a^2+x^2}) + C$

33. $\int \frac{\sqrt{a^2+x^2}}{x} dx = \sqrt{a^2+x^2} - a\ln\left|\frac{a+\sqrt{a^2+x^2}}{x}\right| + C$

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

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

36. $\int \frac{dx}{x\sqrt{a^2+x^2}} = -\frac{1}{a}\ln\left|\frac{a+\sqrt{a^2+x^2}}{x}\right| + C$

37. $\int \frac{dx}{x^2\sqrt{a^2+x^2}} = -\frac{\sqrt{a^2+x^2}}{a^2 x} + C, \quad a \neq 0$

38. $\int \frac{dx}{\sqrt{a^2-x^2}} = \sin^{-1}\frac{x}{a} + C, \quad a \neq 0$

39. $\int \sqrt{a^2-x^2}\,dx = \frac{x}{2}\sqrt{a^2-x^2} + \frac{a^2}{2}\sin^{-1}\frac{x}{a} + C, \quad a \neq 0$

40. $\int x^2\sqrt{a^2-x^2}\,dx = \frac{a^4}{8}\sin^{-1}\frac{x}{a} - \frac{1}{8}x\sqrt{a^2-x^2}(a^2-2x^2) + C, \quad a \neq 0$

41. $\int \frac{\sqrt{a^2-x^2}}{x}\,dx = \sqrt{a^2-x^2} - a\ln\left|\frac{a+\sqrt{a^2-x^2}}{x}\right| + C$

42. $\int \frac{\sqrt{a^2-x^2}}{x^2}dx = -\sin^{-1}\frac{x}{a} - \frac{\sqrt{a^2-x^2}}{x} + C, \quad a \neq 0$

43. $\int \frac{x^2}{\sqrt{a^2-x^2}}\,dx = \frac{a^2}{2}\sin^{-1}\frac{x}{a} - \frac{1}{2}x\sqrt{a^2-x^2} + C, \quad a \neq 0$

44. $\int \frac{dx}{x\sqrt{a^2-x^2}} = -\frac{1}{a}\ln\left|\frac{a+\sqrt{a^2-x^2}}{x}\right| + C, \quad a \neq 0$

45. $\int \frac{dx}{x^2\sqrt{a^2-x^2}} = -\frac{\sqrt{a^2-x^2}}{a^2 x} + C, \quad a \neq 0$

46. $\int \frac{dx}{\sqrt{x^2-a^2}} = \ln\left|x+\sqrt{x^2-a^2}\right| + C$

47. $\int \sqrt{x^2-a^2}\,dx = \frac{x}{2}\sqrt{x^2-a^2} - \frac{a^2}{2}\ln\left|x+\sqrt{x^2-a^2}\right| + C$

48. $\int (\sqrt{x^2-a^2})^n\,dx = \frac{x(\sqrt{x^2-a^2})^n}{n+1} - \frac{na^2}{n+1}\int (\sqrt{x^2-a^2})^{n-2}\,dx, \quad n \neq -1$

49. $\int \frac{dx}{(\sqrt{x^2-a^2})^n} = \frac{x(\sqrt{x^2-a^2})^{2-n}}{(2-n)a^2} + \frac{n-3}{(2-n)a^2}\int \frac{dx}{(\sqrt{x^2-a^2})^{n-2}}, \quad n \neq 2$

50. $\int x(\sqrt{x^2-a^2})^n\,dx = \frac{(\sqrt{x^2-a^2})^{n+2}}{n+2} + C, \quad n \neq -2$

51. $\int x^2\sqrt{x^2-a^2}\,dx=\frac{x}{8}(2x^2-a^2)\sqrt{x^2-a^2}-\frac{a^4}{8}\ln\left|x+\sqrt{x^2-a^2}\right|+C$

52. $\int\frac{\sqrt{x^2-a^2}}{x}\,dx=\sqrt{x^2-a^2}-a\sec^{-1}\left|\frac{x}{a}\right|+C,\quad a\neq 0$

53. $\int\frac{x^2}{\sqrt{x^2-a^2}}\,dx=\frac{a^2}{2}\ln\left|x+\sqrt{x^2-a^2}\right|+\frac{x}{2}\sqrt{x^2-a^2}+C$

54. $\int\frac{\sqrt{x^2-a^2}}{x^2}\,dx=\ln\left|x+\sqrt{x^2-a^2}\right|-\frac{\sqrt{x^2-a^2}}{x}+C$

55. $\int\frac{dx}{x\sqrt{x^2-a^2}}=\frac{1}{a}\sec^{-1}\left|\frac{x}{a}\right|+C,\quad a\neq 0$

56. $\int\frac{dx}{x^2\sqrt{x^2-a^2}}=\frac{\sqrt{x^2-a^2}}{a^2x}+C,\quad a\neq 0$

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

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

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

60. $\int\sin ax\sin bx\,dx=\frac{\sin(a-b)x}{2(a-b)}-\frac{\cos(a-b)x}{2(a+b)}+C,\quad a^2\neq b^2$

61. $\int\sin ax\cos bx\,dx=-\frac{\cos(a+b)x}{2(a+b)}-\frac{\cos(a-b)x}{2(a-b)}+C,\quad a^2\neq b^2$

62. $\int\cos ax\cos bx\,dx=\frac{\sin(a-b)x}{2(a-b)}+\frac{\sin(a+b)x}{2(a+b)}+C,\quad a^2\neq b^2$

63. $\int\sin ax\cos ax\,dx=-\frac{\cos 2ax}{4a}+C,\quad a\neq 0$

64. $\int\sin^n ax\cos ax\,dx=\frac{\sin^{n+1}ax}{(n+1)a}+C,\quad a\neq 0,\quad n\neq -1$

65. $\int\cos^n ax\sin ax\,dx=-\frac{\cos^{n+1}ax}{(n+1)a}+C,\quad a\neq 0,\quad n\neq -1$

66. $\int\frac{\sin ax}{\cos ax}\,dx=-\frac{1}{a}\ln\left|\cos ax\right|+C,\quad a\neq 0$

67. $\int\frac{\cos ax}{\sin ax}\,dx=\frac{1}{a}\ln\left|\sin ax\right|+C,\quad a\neq 0$

68. $\int\sin^n ax\cos^m ax\,dx$

$$= -\frac{\sin^{n-1} ax \cos^{m+1} ax}{a(m+n)} + \frac{n-1}{m+n} \int \sin^{n-2} ax \cos^{m} ax dx, \quad a \neq 0, \quad m+n \neq 0$$

69. $$\int \frac{dx}{b + c\sin ax} = \frac{-2}{a\sqrt{b^2 - c^2}} \tan^{-1} \left| \sqrt{\frac{b-c}{b+c}} \tan\left(\frac{\pi}{4} - \frac{ax}{2}\right) \right| + C, \quad a \neq 0, \quad b^2 > c^2$$

70. $$\int \frac{dx}{b + c\sin ax} = \frac{-1}{a\sqrt{c^2 - b^2}} \ln \left| \frac{c + b\sin ax + \sqrt{c^2 - b^2}\cos ax}{b + c\sin ax} \right| + C, \quad a \neq 0, \quad b^2 < c^2$$

71. $$\int \frac{dx}{1 + \sin ax} = -\frac{1}{a} \tan\left(\frac{\pi}{4} - \frac{ax}{2}\right) + C, \quad a \neq 0$$

72. $$\int \frac{dx}{1 - \sin ax} = \frac{1}{a} \tan\left(\frac{\pi}{4} + \frac{ax}{2}\right) + C, \quad a \neq 0$$

73. $$\int \frac{dx}{b + c\cos ax} = \frac{2}{a\sqrt{b^2 - c^2}} \tan^{-1} \left| \sqrt{\frac{b-c}{b+c}} \tan\frac{ax}{2} \right| + C, \quad a \neq 0, \quad b^2 > c^2$$

74. $$\int \frac{dx}{b + c\cos ax} = \frac{1}{a\sqrt{c^2 - b^2}} \ln \left| \frac{c + b\cos ax + \sqrt{c^2 - b^2}\sin ax}{b + c\cos ax} \right| + C, \quad a \neq 0, \quad b^2 < c^2$$

75. $$\int \frac{dx}{1 + \cos ax} = \frac{1}{a} \tan\frac{ax}{2} + C, \quad a \neq 0$$

76. $$\int \frac{dx}{1 - \cos ax} = -\frac{1}{a} \cot\frac{ax}{2} + C, \quad a \neq 0$$

77. $$\int x \sin ax dx = \frac{1}{a^2} \sin ax - \frac{x}{a} \cos ax + C, \quad a \neq 0$$

78. $$\int x^n \sin ax dx = -\frac{x^n}{a} \cos ax + \frac{n}{a} \int x^{n-1} \cos ax dx, \quad a \neq 0$$

79. $$\int x^n \cos ax dx = \frac{x^n}{a} \sin ax - \frac{n}{a} \int x^{n-1} \sin ax dx, \quad a \neq 0$$

80. $$\int \tan ax dx = \frac{1}{-a} \ln|\cos ax| + C, \quad a \neq 0$$

81. $$\int \cot ax dx = \frac{1}{a} \ln|\sin ax| + C, \quad a \neq 0$$

82. $$\int \tan^2 ax dx = \frac{1}{a} \tan ax - x + C, \quad a \neq 0$$

83. $$\int \cot^2 ax dx = -\frac{1}{a} \cot ax - x + C, \quad a \neq 0$$

84. $$\int \tan^n ax dx = \frac{\tan^{n-1} ax}{a(n-1)} - \int \tan^{n-2} ax dx, \quad a \neq 0, \quad n \neq 1$$

85. $\int \cot^n axdx = -\frac{\cot^{n-1} ax}{a(n-1)} - \int \cot^{n-2} axdx,\ a \neq 0,\ n \neq 1$

86. $\int \sec axdx = \frac{1}{a}\ln\left|\sec ax + \tan ax\right| + C,\ a \neq 0$

87. $\int \csc axdx = -\frac{1}{a}\ln\left|\csc ax + \cot ax\right| + C,\ a \neq 0$

88. $\int \sec^n axdx = \frac{\sec^{n-2} ax \tan ax}{a(n-1)} + \frac{n-2}{n-1}\int \sec^{n-2} axdx,\ a \neq 0,\ n \neq 1$

89. $\int \csc^n axdx = -\frac{\csc^{n-2} ax \cot ax}{a(n-1)} + \frac{n-2}{n-1}\int \csc^{n-2} axdx,\ a \neq 0,\ n \neq 1$

90. $\int \sec^n ax \tan axdx = \frac{\sec^n ax}{na} + C,\ a \neq 0,\ n \neq 0$

91. $\int \csc^n ax \cot axdx = -\frac{\csc^n ax}{na} + C,\ a \neq 0,\ n \neq 0$

92. $\int \sin^{-1} axdx = x\sin^{-1} ax + \frac{1}{a}\sqrt{1-a^2x^2} + C,\ a \neq 0$

93. $\int \cos^{-1} axdx = x\cos^{-1} ax - \frac{1}{a}\sqrt{1-a^2x^2} + C,\ a \neq 0$

94. $\int \tan^{-1} axdx = x\tan^{-1} ax - \frac{1}{2a}\ln(1+a^2x^2) + C,\ a \neq 0$

95. $\int xe^{ax}dx = \frac{e^{ax}}{a^2}(ax-1) + C,\ a \neq 0$

96. $\int b^{ax}dx = \frac{b^{ax}}{a\ln b} + C,\ a \neq 0,\ b > 0,\ b \neq 1$

97. $\int x^n e^{ax}dx = \frac{x^n e^{ax}}{a} - \frac{n}{a}\int x^{n-1}e^{ax}dx,\ a \neq 0$

98. $\int e^{ax}\sin bxdx = \frac{e^{ax}}{a^2+b^2}(a\sin bx - b\cos bx) + C$

99. $\int e^{ax}\cos bxdx = \frac{e^{ax}}{a^2+b^2}(a\cos bx + b\sin bx) + C$

100. $\int \ln axdx = x\ln ax - x + C$

101. $\int x^n(\ln ax)^m dx = \frac{x^{n+1}(\ln ax)^m}{n+1} - \frac{m}{n+1}\int x^n(\ln ax)^{m-1}dx,\ n \neq -1$

102. $\int \frac{(\ln ax)^m}{x}dx = \frac{(\ln ax)^{m+1}}{m+1} + C,\ m \neq -1$

103. $\int \frac{dx}{x\ln ax} = \ln\left|\ln ax\right| + C$