

Indefinite Integrals

Key points to remember

- **Integration is the reverse process of differentiation.**
- Let $\frac{d}{dx} F(x) = f(x)$ then write $\int f(x) dx = F(x) + C$.
- These integrals are called **indefinite integrals** and c is called **constant of integration**.
- From geometrical point of view an indefinite integral is **collection of family of curves** each of which is obtained by translating one of the curves parallel to itself upwards or downwards along with y -axis.

ASSIGNMENT

1. $\int (2^x + e^x)^2 dx$
2. $\int 3^{2x+5} dx$
3. $\int \frac{\sin x}{\sin 3x} dx$
4. $\int \frac{dx}{\cos(x-a)\cos(x-b)}$
5. $\int \sin^4 x dx$
6. $\int \tan^4 x dx$
7. $\int \sqrt{\tan x} dx$
8. $\int \sqrt{\cot x} dx$
9. $\int \sin^3 x \cos^4 x dx$
10. $\int \cos x \cos 2x \cos 3x dx$
11. $\int (\sqrt{\tan x} + \sqrt{\cot x}) dx$
12. $\int (a^x + b^x)^2 / (a^x b^x) dx$
13. $\int \frac{(\cos 2x - \cos 2\beta)}{(\cos x - \cos \beta)} dx$
14. $\int \sin^{-1}(\cos x) dx$
15. $\int \frac{dx}{(e^x + e^{-x})}$
16. $\int \sqrt{e^x - 1} dx$
17. $\int \cos^{-1}\left(\frac{1 - \tan^2 x}{1 + \tan^2 x}\right) dx$
18. $\int \cos^{-1}(\sec x - \tan x) dx$
19. $\int e^{\frac{x}{2}} \sin\left(\frac{x}{2} + \frac{\pi}{4}\right) dx$
20. $\int e^{\sin x} \sin 2x dx$
21. $\int \frac{x^5}{(2-x^3)^4} dx$
22. $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$
23. $\int e^{\frac{-x}{2}} \left(\sqrt{\frac{1 - \sin x}{1 + \cos x}}\right) dx$
24. $\int e^{-x} \left(\frac{1}{x} + \frac{1}{x^2}\right) dx$
25. $\int \frac{\sin^{-1} \sqrt{x} - \cos^{-1} \sqrt{x}}{\sin^{-1} \sqrt{x} + \cos^{-1} \sqrt{x}} dx$
26. $\int \cos \sqrt{x} dx$
27. $\int (e^{a \log x} + e^{x \log a}) dx$
28. $\int \frac{\log(\log x)}{x} dx$
29. $\int (2x+1) \sqrt{x^2 + 4} dx$
30. $\int (2x-5) \sqrt{1 - 3x^2} dx$
31. $\int \log x \sin^{-1} x dx$
32. $\int \sin x \log(\sin x) dx$
33. $\int \frac{x^2 + 2x + 3}{\sqrt{x^2 + x - 1}} dx$
34. $\int \frac{x^2 + 1}{\sqrt{x^2 - 5}} dx$
35. $\int \sin^{-1} \sqrt{\frac{x}{a+x}} dx$
36. $\int \frac{x \tan^{-1} x}{(1+x^2)^{\frac{3}{2}}} dx$
37. $\int \frac{1}{\cos x (5 - 4 \sin x)} dx$
38. $\int \frac{1}{\sin x (3 + 2 \cos x)} dx$
39. $\int \cos^{-1}\left(\frac{1}{x}\right) dx$
40. $\int \frac{\sin^{-1} x}{\sqrt{1-x}} dx$
41. $\int \frac{1}{(\sin x + \sin 2x)} dx$
42. $\int \frac{1}{(x^{-1} + 1)x} dx$
43. $\int (\sin^{-1} x)^2 dx$
44. $\int x^2 \tan^{-1} x dx$
45. $\int \frac{1}{x^8 - x} dx$
46. $\int \frac{x^2}{16 - x^6} dx$
47. $\int \frac{x \tan^{-1} x}{(1+x^2)^2} dx$
48. $\int e^{3x} \left(\frac{3 + \tan x}{\cos x}\right) dx$

49. $\int \frac{x^5}{x^3-2x^2-5x+6} dx$ 50. $\int \frac{x^3-1}{(x+1)(x+2)(x+3)} dx$ 51. $\int e^x \left(\frac{\sin 4x-4}{1-\cos 4x} \right) dx$ 52. $\int \frac{\log x}{x^2} dx$
53. $\int \frac{1}{x^7+x} dx$ 54. $\int \frac{1}{2e^{2x}+e^x-1} dx$ 55. $\int (\tan \alpha + \tan^3 \alpha)(1 + \tan 3\alpha) d\alpha$ 56. $\int \frac{3\tan \beta - \tan^3 \beta}{1-3\tan^2 \beta} d\beta$
57. $\int \frac{1}{\sin x + \cos x} dx$ 58. $\int \frac{\sin x}{\sin x + \cos x} dx$ 59. $\int e^x \left(\frac{1+x \log x}{x} \right) dx$ 60. $\int (x^2+x)e^x dx$
61. $\int \sqrt{\frac{a+x}{a-x}} dx$ 62. $\int \frac{\sqrt{a}-\sqrt{x}}{1+\sqrt{a}\sqrt{x}} dx$ 63. $\int \sin^4 x \cos^4 x dx$ 64. $\int \frac{1}{3+2 \sin x + \cos x} dx$
65. $\int x \sqrt{x^2 + a^2} dx$ 66. $\int x \sqrt{\frac{1-x}{1+x}} dx$ 67. $\int \frac{1}{\sqrt{\sin^3 x \sin(x+\alpha)}} dx$ 68. $\int \frac{1}{\sin^3 x + \cos^3 x} dx$
69. $\int \frac{\sqrt{1-\sqrt{x}}}{1+\sqrt{x}} dx$ 70. $\int x \sqrt{1+x^4} dx$ 71. $\int \frac{1}{(a+b \cos x)} dx$ 72. $\int \frac{\cos x}{\cos 3x} dx$
73. $\int \frac{\sin x}{\sin 4x} dx$ 74. $\int \frac{1}{(x^2+1)\sqrt{x}} dx$ 75. $\int \frac{1+\tan^2 x}{1-\tan^3 x} dx$ 76. $\int \frac{\sin 2x}{(1+\sin x)(2+\sin x)} dx$
77. $\int \tan^3 x dx$ 78. $\int \sin^6 x dx$ 79. $\int \frac{1}{\sin x + \tan x} dx$ 80. $\int x \sin 3x \cos 5x dx$
81. $\int \sec^5 x dx$ 82. $\int \sec^2 x \operatorname{cosec}^2 x dx$ 83. $\int \sqrt{x^2 - 10x + 29} dx$ 84. $\int \sqrt{15 + 4x - x^2} dx$
85. $\int \frac{\cos 2x}{\cos x \sin x} dx$ 86. $\int \frac{3\cos^3 x - 2\sin^3 x}{\sin x \cos x} dx$ 87. $\int \frac{1}{\sqrt{x^2-a^2}} dx$ 88. $\int \frac{1}{\sqrt{x^2+a^2}} dx$
89. $\int \frac{1}{(\sin x + b \cos x)^2} dx$ 90. $\int \frac{\cos x + \sin x}{1 + \sin 2x} dx$ 91. $\int \frac{1}{x^2-a^2} dx$ 92. $\int \frac{1}{a^2-x^2} dx$
93. $\int (\tan^n x + \tan^{n+2} x) dx$ 94. $\int \sqrt{\frac{\tan x}{\sin x \cos x}} dx$ 95. $\int \sqrt{a^2 + x^2} dx$ 96. $\int \sqrt{a^2 - x^2} dx$
97. $\int \frac{dx}{(\sin x + 2 \cos x)(3 \sin x - \cos x)}$ 98. $\int \frac{\cos x}{\cos(x+\alpha)} dx$ 99. $\int \sqrt{x^2 - a^2} dx$ 100. $\int (x-2)\sqrt{1-2x-x^2} dx$

FROM BOARD PAPERS

1. $\int \frac{dx}{1+\sin x}$ 2. $\int \tan^{-1} \left(\frac{1-x}{1+x} \right) dx$ 3. $\int \frac{x e^x}{x^2+1} dx$ 4. $\int \frac{\sin 2x}{a \cos^2 x + b \sin^2 x} dx$
5. $\int \sin^{-1}(3x-4x^3) dx$ 6. $\int e^x \operatorname{cosec}^2 e^x dx$ 7. $\int \frac{2x}{(x^2+1)(x^2+2)} dx$ 8. $\int \frac{2x+5}{(x^2-x-2)} dx$
9. $\int e^x (\sec x + \sec x \tan x) dx$ 10. $\int \sqrt{1-x^2} dx$ 11. $\int \sec^4 x \tan x dx$ 12. $\int \frac{\log x}{x^2} dx$
13. $\int \frac{\sin 4x}{\sin x} dx$ 14. $\int e^x \cos x dx$ 15. $\int \frac{x}{x^4+x^2+1} dx$ 16. $\int \frac{x \sin^{-1} x^2}{\sqrt{1-x^4}} dx$

17. $\int (x+1)(x \log x)^2 dx$ 18. $\int \cos 2x \log(\sin x) dx$ 19. $\int \frac{x^2 \tan^{-1} x}{1+x^2} dx$ 20. $\int \frac{\cos x}{(1+\sin 2x)(2+\sin x)} dx$
21. $\int e^x \sec x(1+\tan x) dx$ 22. $\int \frac{x^2-1}{x^4+1} dx$ 23. $\int \frac{x \log x}{(x+2)(x-1)} dx$ 24. $\int (x^2-4x-3) dx$
25. $\int \frac{(\sin x \cos x - 1)}{\sin^2 x} e^x dx$ 26. $\int x^2 \sin^{-1} x dx$ 27. $\int \frac{x^2+x-6}{(x-2)(x-1)} dx$ 28. $\int e^x (\tan x + \log \sin x) dx$
29. $\int \frac{\sqrt{a-x}}{\sqrt{a+x}} dx$ 30. $\int \frac{dx}{\sqrt{x+a}\sqrt{x+b}} dx$ 31. $\int \frac{dx}{x \cos^2(1+\log x)} dx$ 32. $\int \frac{x-\sin x}{1-\cos x} dx$
33. $\int \frac{3x+5}{x^3-x^2-x+1} dx$ 34. $\int \frac{e^x(2-\sin 2x)}{(1-\cos 2x)} dx$ 35. $\int \frac{x^2-1}{x^4+x^2+1} dx$ 36. $\int \frac{e^{2x}+1}{e^{2x}-1} dx$
37. $\int x\sqrt{1+x-x^2} dx$ 38. $\int \frac{dx}{x+\sqrt{x}}$ 39. $\int \sin^{-1}\left(\frac{2x}{x^2+1}\right) dx$ 40. $\int \frac{x dx}{\sqrt{8+x-x^2}} dx$
41. $\int \frac{2\sin 2\theta - \cos \theta}{6 - \cos^2 \theta - 4\sin \theta} dx$ 42. $\int e^{-x} \sin^2 x dx$ 43. $\int \frac{dx}{(x-1)(x+1)(x+2)}$ 44. $\int (2x-1)(x-3)^{\frac{5}{3}} dx$
45. $\int \frac{dx}{\sqrt{x-\alpha}\sqrt{x-\beta}}$ 46. $\int \frac{(2+\sin 2x)}{(1+\cos 2x)} e^x dx$ 47. $\int \sin^{-1} x dx$ 48. $\int \frac{dx}{1+x^4}$
49. $\int \frac{dx}{\sqrt{x(1-2x)}}$ 50. $\int \sec x \log(\sec x + \tan x) dx$ 51. $\int \sec^{-1} x dx$ 52. $\int \frac{dx}{(1+\cos x)}$
53. $\int \frac{x^4}{x^4-1} dx$ 54. $\int x \tan^{-1} x dx$ 55. $\int \frac{1-\tan x}{1+\tan x} dx$ 56. $\int \frac{x^2+2}{(x^2+1)(x^2+4)} dx$
57. $\int \frac{x^2+1}{x^4-x^2+1} dx$ 58. $\int \frac{x^2}{(x-1)(x+1)^2} dx$ 59. $\int x^3 \log 2x dx$ 60. $\int \frac{e^x}{e^{2x}-4} dx$
61. $\int x^3 e^x dx$ 62. $\int \frac{\sec^2(2\tan^{-1} x)}{1+x^2} dx$ 63. $\int \frac{dx}{9x^2+12x+13}$ 64. $\int \frac{dx}{x^3+x^2+x+1}$
65. $\int \frac{dx}{\cos^2 x + 2\sin^2 x}$ 66. $\int \frac{dx}{\sqrt{1+\cos 2x}}$ 67. $\int \frac{x^2+1}{x^4+1} dx$ 68. $\int e^{ax} \cos(bx+c) dx$
69. $\int \cos 4x \cos 3x dx$ 70. $\int \frac{dx}{\sqrt{7-6x-x^2}}$ 71. $\int x \tan^{-1} x dx$ 72. $\int \frac{5}{(x^2+1)(x+2)} dx$
73. $\int (2x-5)\sqrt{x^2-4x+3} dx$ 74. $\int x^3 \cos x^4 dx$ 75. $\int \frac{e^x(1+\sin x \cos x)}{\cos^2 x} dx$ 76. $\int (2x+3)\sqrt{x^2+4x+3} dx$
77. $\int (\cot x + \log(\sin x))e^x dx$ 78. $\int \frac{dx}{(x^2+1)x}$ 79. $\int \frac{x}{\cos^2 x} dx$ 80. $\int \frac{dx}{\sqrt{2x+1}\sqrt{2x+2}}$
81. $\int \frac{dx}{(x^3+1)x}$ 82. $\int \frac{dx}{(x^8+1)x}$ 83. $\int \frac{dx}{x^2+6x+12}$ 84. $\int \frac{dx}{\sqrt{x^2-4x+2}}$
85. $\int x \log(x+1) dx$ 86. $\int \frac{dx}{(x^6+1)x}$ 87. $\int \frac{dx}{\sqrt{x^2-6x+10}}$ 88. $\int x \cos^{-1} x dx$

$$89. \int e^x (\tan x + \log(\sec x)) dx \quad 90. \int \sin(\log x) dx$$

$$91. \int \frac{e^x(1+x)}{(2+x)^2} dx$$

$$92. \int \tan^{-1}(\sqrt{x}) dx$$

$$93. \int \sqrt{2ax - x^2} dx$$

$$94. \int \frac{dx}{x^{\frac{1}{2}} + x^{\frac{1}{3}}}$$

$$95. \int \log[x + \sqrt{x^2 + a^2}] dx$$

$$96. \int \sqrt{\frac{\cos 2x}{\cos x}} dx$$

$$97. \int \frac{dx}{(4+5 \sin x)}$$

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