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. $\int {}^{\sin x}/_{\sin 3x}\, dx$
4. $\int {}^{dx}/_{\cos(x-a)\cos(x-b)}$
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. $\int {}^{(\cos 2x - \cos 2\beta)}/_{(\cos x - \cos\beta)} dx$
14. $\int \sin^{-1}(\cos x)\, dx$
15. $\int dx/(e^x + e^{-x})$
16. $\int \sqrt{e^x - 1}\, dx$
17. $\int \cos^{-1}\left(\frac{1-\tan^2 x}{1+\tan^2 x}\right)$
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. $\int e^{\sin x} \sin 2\alpha\, dx$
21. $\int \frac{x^5}{(2-x^3)^4}\, dx$
22. $\int \frac{\sin\sqrt{x}}{\sqrt{x}}\, dx$
23. $\int e^{\frac{-x}{2}}\left(\sqrt{\frac{1-\sin x}{1+\cos x}}\right)$
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. $\int \sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}\,dx$ 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. $\int \sec^2 x\,\mathrm{cosec}^2 x\,dx$ 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. $\int \frac{1}{(a\sin x+b\cos x)^2}\,dx$ 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. $\int \frac{xe^x}{x^2+1}\,dx$ 4. $\int \frac{\sin 2x}{a\cos^2 x+b\sin^2 x}\,dx$

5. $\int \sin^{-1}(3x-4x^3)\,dx$ 6. $\int e^x\mathrm{cosec}^2 e^x\,dx$ 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. $\int e^x(\tan x + \log(\sec x)dx$ 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. $\int \frac{dx}{(4+5\, sinx)}$