

EXERCISE-I

Fundamental Integration

1. $\int \frac{dx}{1 - \sin x} =$
 (A) $x + \cos x + c$ (B) $1 + \sin x + c$
 (C) $\sec x - \tan x + c$ (D) $\sec x + \tan x + c$
2. If $\int (\sin 2x - \cos 2x) dx = \frac{1}{\sqrt{2}} \sin(2x - a) + b$, then
 (A) $a = \frac{\pi}{4}, b = 0$
 (B) $a = -\frac{\pi}{4}, b = 0$
 (C) $a = \frac{5\pi}{4}, b = \text{any constant}$
 (D) $a = -\frac{5\pi}{4}, b = \text{any constant}$
3. $\int \left(1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots \right) dx =$
 (A) $-e^x + c$ (B) $e^x + c$
 (C) $e^{-x} + c$ (D) $-e^{-x} + c$
4. $\int \frac{\cot x \tan x}{\sec^2 x - 1} dx =$
 (A) $\cot x - x + c$ (B) $-\cot x + x + c$
 (C) $\cot x + x + c$ (D) $-\cot x - x + c$
5. $\int (\sec x + \tan x)^2 dx =$
 (A) $2(\sec x + \tan x) - x + c$
 (B) $1/3(\sec x + \tan x)^3 + c$
 (C) $\sec x(\sec x + \tan x) + c$
 (D) $2(\sec x + \tan x) + c$
6. $\int (1 + 2x + 3x^2 + 4x^3 + \dots) dx =$
 (A) $(1 + x)^{-1} + c$ (B) $(1 - x)^{-1} + c$
 (C) $(1 - x)^{-1} - 1 + c$ (D) None of these
7. If $\int (\cos x - \sin x) dx = \sqrt{2} \sin(x + \alpha) + c$, then $\alpha =$
 (A) $\frac{\pi}{3}$ (B) $-\frac{\pi}{3}$
 (C) $\frac{\pi}{4}$ (D) $-\frac{\pi}{4}$
8. $\int \frac{3x^2 - 2\sqrt{x}}{x} dx =$
 (A) $x^3 - \sqrt{x} + c$ (B) $x^3 + \sqrt{x} + c$
 (C) $x^3 - 2\sqrt{x} + c$ (D) $x^3 - 4\sqrt{x} + c$
9. If $\int \frac{dx}{1 + \sin x} = \tan\left(\frac{x}{2} + a\right) + b$, then
 (A) $a = \frac{\pi}{4}, b = 3$
 (B) $a = -\frac{\pi}{4}, b = 3$
 (C) $a = \frac{\pi}{4}, b = \text{arbitrary constant}$
 (D) $a = -\frac{\pi}{4}, b = \text{arbitrary constant}$
10. $\int \frac{dx}{\sin x + \cos x} =$
 (A) $\log \tan\left(\frac{\pi}{8} + \frac{x}{2}\right) + c$
 (B) $\log \tan\left(\frac{\pi}{8} - \frac{x}{2}\right) + c$
 (C) $\frac{1}{\sqrt{2}} \log \tan\left(\frac{\pi}{8} + \frac{x}{2}\right) + c$
 (D) None of these
11. $\int \frac{\sin 3x}{\sin x} dx =$
 (A) $x + \sin 2x + c$ (B) $3x + \sin 2x + c$
 (C) $3x + \sin^2 x + c$ (D) None of these
12. If $\int \frac{f(x) dx}{\log \sin x} = \log \log \sin x$, then $f(x) =$
 (A) $\sin x$ (B) $\cos x$
 (C) $\log \sin x$ (D) $\cot x$

13. $\int \frac{\sin x + \operatorname{cosec} x}{\tan x} dx =$

- (A) $\sin x - \operatorname{cosec} x + c$
 (B) $\operatorname{cosec} x - \sin x + c$
 (C) $\log \tan x + c$
 (D) $\log \cot x + c$

14. $\int \frac{1}{\sqrt{1 + \sin x}} dx =$

- (A) $2\sqrt{2} \log \tan\left(\frac{\pi}{8} + \frac{x}{4}\right) + c$
 (B) $\frac{1}{\sqrt{2}} \log \tan\left(\frac{\pi}{8} + \frac{x}{4}\right) + c$
 (C) $\sqrt{2} \log \tan\left(\frac{\pi}{8} + \frac{x}{4}\right) + c$
 (D) $\frac{1}{2\sqrt{2}} \log \tan\left(\frac{\pi}{8} + \frac{x}{4}\right) + c$

15. $\int (\tan x - \cot x)^2 dx =$

- (A) $\tan x + \cot x + c$ (B) $\sec x \tan x + c$
 (C) $\operatorname{cosec} x \cot x + c$ (D) None of these

16. The value of $\int \frac{1}{x^4} dx$ is

- (A) $\frac{1}{-3x^3} + c$ (B) $\frac{1}{3x^3} + c$
 (C) $\frac{1}{-4x^3} + c$ (D) $-\frac{1}{3x^2} + c$

17. $\int \frac{e^{5 \log x} - e^{4 \log x}}{e^{3 \log x} - e^{2 \log x}} dx =$

- (A) $e \cdot 3^{-3x} + c$ (B) $e^3 \log x + c$
 (C) $\frac{x^3}{3} + c$ (D) None of these

18. $\int \frac{x^4 + x^2 + 1}{x^2 - x + 1} dx =$

- (A) $\frac{1}{3}x^3 + \frac{1}{2}x^2 + x + c$ (B) $\frac{1}{3}x^3 - \frac{1}{2}x^2 + x + c$
 (C) $\frac{1}{3}x^3 + \frac{1}{2}x^2 - x + c$ (D) None of these

19. $\int \sec x dx =$

- (A) $\log \tan\left(\frac{\pi}{8} + \frac{x}{2}\right) + c$
 (B) $-\log(\sec x - \tan x) + c$
 (C) $\log(\sec x - \tan x) + c$
 (D) None of these

20. $\int \sqrt{1 + \sin x} dx =$

- (A) $\frac{1}{2} \left(\sin \frac{x}{2} + \cos \frac{x}{2} \right) + c$
 (B) $\frac{1}{2} \left(\sin \frac{x}{2} - \cos \frac{x}{2} \right) + c$
 (C) $2\sqrt{1 + \sin x} + c$
 (D) $-2\sqrt{1 - \sin x} + c$

21. $\int e^{\log(\sin x)} dx =$

- (A) $\sin x + c$ (B) $-\cos x + c$
 (C) $e^{\log(\cos x)} + c$ (D) None of these

22. $\int e^{x \log a} \cdot e^x dx$ is equal to

- (A) $(ae)^x + c$ (B) $\frac{(ae)^x}{\log(ae)} + c$
 (C) $\frac{e^x}{1 + \log a} + c$ (D) None of these

23. $\int \frac{1}{\sqrt{1 + \cos x}} dx =$

- (A) $\sqrt{2} \log \left(\sec \frac{x}{2} + \tan \frac{x}{2} \right) + K$
 (B) $\frac{1}{\sqrt{2}} \log \left(\sec \frac{x}{2} + \tan \frac{x}{2} \right) + K$
 (C) $\log \left(\sec \frac{x}{2} + \tan \frac{x}{2} \right) + K$
 (D) None of these

24. $\int \frac{\cos 2x - 1}{\cos 2x + 1} dx =$

- (A) $\tan x - x + c$ (B) $x + \tan x + c$
 (C) $x - \tan x + c$ (D) $-x - \cot x + c$

25. $\int \frac{ax^3 + bx^2 + c}{x^4} dx$ equals to
 (A) $a \log x + \frac{b}{x^2} + \frac{c}{3x^3} + c$
 (B) $a \log x + \frac{b}{x} - \frac{c}{3x^3} + c$
 (C) $a \log x - \frac{b}{x} - \frac{c}{3x^3} + c$
 (D) None of these
26. $\int \sec x \tan x dx =$
 (A) $\sec x + \tan x + c$ (B) $\sec x + c$
 (C) $\tan x + c$ (D) $-\sec x + c$
27. $\int (\sin^4 x - \cos^4 x) dx =$
 (A) $-\frac{\cos 2x}{2} + c$ (B) $-\frac{\sin 2x}{2} + c$
 (C) $\frac{\sin 2x}{2} + c$ (D) $\frac{\cos 2x}{2} + c$
28. $\int \frac{(x+1)^2 dx}{x(x^2+1)}$ is equal to
 (A) $\log_e x + c$
 (B) $\log_e x + 2 \tan^{-1} x + c$
 (C) $\log_e \frac{1}{x^2+1} + c$
 (D) $\log_e \{x(x^2+1)\} + c$
29. The value of $\int \frac{dx}{\sqrt{1-x}}$ is
 (A) $2\sqrt{1-x} + c$ (B) $-2\sqrt{1-x} + c$
 (C) $-\sin^{-1} \sqrt{x} + c$ (D) $\sin^{-1} \sqrt{x} + c$
30. $\int \frac{dx}{1-x^2} =$
 (A) $\tan^{-1} x + c$ (B) $\sin^{-1} x + c$
 (C) $\frac{1}{2} \ln \left| \frac{1+x}{1-x} \right| + c$ (D) $\frac{1}{2} \ln \left| \frac{1-x}{1+x} \right| + c$
31. $\int \frac{\cot x}{\log \sin x} dx =$
 (A) $\log(\log \sin x) + c$ (B) $\log(\log \operatorname{cosec} x) + c$
 (C) $2 \log(\log \sin x) + c$ (D) None of these
32. $\int \frac{(1 + \log x)^2}{x} dx =$
 (A) $(1 + \log x)^3 + c$ (B) $3(1 + \log x)^3 + c$
 (C) $\frac{1}{3}(1 + \log x)^3 + c$ (D) None of these
33. $\int \sec^p x \tan x dx =$
 (A) $\frac{\sec^{p+1} x}{p+1} + c$ (B) $\frac{\sec^p x}{p} + c$
 (C) $\frac{\tan^{p+1} x}{p+1} + c$ (D) $\frac{\tan^p x}{p} + c$
34. $\int \frac{dx}{e^x - 1} =$
 (A) $\ln(1 - e^{-x}) + c$ (B) $-\ln(1 - e^{-x}) + c$
 (C) $\ln(e^x - 1) + c$ (D) None of these
35. $\int x^2 \sec x^3 dx =$
 (A) $\log(\sec x^3 + \tan x^3)$ (B) $3(\sec x^3 + \tan x^3)$
 (C) $\frac{1}{3} \log(\sec x^3 + \tan x^3)$ (D) None of these
36. $\int \frac{a^x}{\sqrt{1-a^{2x}}} dx =$
 (A) $\frac{1}{\log a} \sin^{-1} a^x + c$ (B) $\sin^{-1} a^x + c$
 (C) $\frac{1}{\log a} \cos^{-1} a^x + c$ (D) $\cos^{-1} a^x + c$
37. $\int \frac{\sqrt{\tan x}}{\sin x \cos x} dx =$
 (A) $2\sqrt{\sec x} + c$ (B) $2\sqrt{\tan x} + c$
 (C) $\frac{2}{\sqrt{\tan x}} + c$ (D) $\frac{2}{\sqrt{\sec x}} + c$
38. $\int \frac{\sin 2x}{a^2 + b^2 \sin^2 x} dx =$
 (A) $\frac{1}{b^2} \log(a^2 + b^2 \sin^2 x) + c$
 (B) $\frac{1}{b} \log(a^2 + b^2 \sin^2 x) + c$
 (C) $\log(a^2 + b^2 \sin^2 x) + c$
 (D) $b^2 \log(a^2 + b^2 \sin^2 x) + c$

Integration by substitution

31. $\int \frac{\cot x}{\log \sin x} dx =$
 (A) $\log(\log \sin x) + c$ (B) $\log(\log \operatorname{cosec} x) + c$
 (C) $2 \log(\log \sin x) + c$ (D) None of these

39. $\int \frac{1}{x\sqrt{1+\log x}} dx =$
 (A) $\frac{2}{3}(1+\log x)^{3/2} + c$ (B) $(1+\log x)^{3/2} + c$
 (C) $2\sqrt{1+\log x} + c$ (D) $\sqrt{1+\log x} + c$
40. $\int \frac{\sec^2 x}{1+\tan x} dx =$
 (A) $\log(\cos x + \sin x) + c$ (B) $\log(\sec^2 x) + c$
 (C) $\log(1+\tan x) + c$ (D) $-\frac{1}{(1+\tan x)^2} + c$
41. $\int \frac{e^{-x}}{1+e^x} dx =$
 (A) $\log(1+e^x) - x - e^{-x} + c$
 (B) $\log(1+e^x) + x - e^{-x} + c$
 (C) $\log(1+e^x) - x + e^{-x} + c$
 (D) $\log(1+e^x) + x + e^{-x} + c$
42. $\int \frac{1}{\sqrt{1-e^{2x}}} dx =$
 (A) $x - \log[1 + \sqrt{1-e^{2x}}] + c$
 (B) $x + \log[1 + \sqrt{1-e^{2x}}] + c$
 (C) $\log[1 + \sqrt{1-e^{2x}}] - x + c$
 (D) None of these
43. $\int \frac{3x^2}{\sqrt{9-16x^6}} dx =$
 (A) $\frac{1}{4}\sin^{-1}\left(\frac{4x^3}{3}\right) + c$ (B) $\frac{1}{3}\sin^{-1}\left(\frac{4x^3}{3}\right) + c$
 (C) $\frac{1}{4}\sin^{-1} x^3 + c$ (D) $\frac{1}{3}\sin^{-1} x^3 + c$
44. $\int \cos x \sqrt{4 - \sin^2 x} dx =$
 (A) $\frac{1}{2}\sin x \sqrt{4 - \sin^2 x} - 2\sin^{-1}\left(\frac{1}{2}\sin x\right) + c$
 (B) $\frac{1}{2}\sin x \sqrt{4 - \sin^2 x} + 2\sin^{-1}\left(\frac{1}{2}\sin x\right) + c$
 (C) $\frac{1}{2}\sin x \sqrt{4 - \sin^2 x} + \sin^{-1}\left(\frac{1}{2}\sin x\right) + c$
 (D) None of these
45. $\int x^2(3)^{x^3+1} dx =$
 (A) $(3)^{x^3} + c$ (B) $\frac{(3)^{x^3}}{\log 3} + c$
 (C) $\log 3(3)^{x^3} + c$ (D) None of these
46. $\int \frac{1}{x^3} [\log x^x]^2 dx =$
 (A) $\frac{x^3}{3}(\log x) + x + c$ (B) $\frac{1}{3}(\log x)^3 + c$
 (C) $3\log(\log x) + c$ (D) None of these
47. $\int \frac{1}{x} \sec^2(\log x) dx =$
 (A) $\tan(\log x) + c$
 (B) $\log(\sec x) + c$
 (C) $\log(\tan x) + c$
 (D) $\sec(\log x) \cdot \tan(\log x) + c$
48. $\int \frac{dx}{x \log x \log(\log x)} =$
 (A) $2\log(\log x) + c$ (B) $\log[\log(\log x)] + c$
 (C) $\log(x \log x) + c$ (D) None of these
49. $\int \frac{\sec^2 x dx}{\sqrt{\tan^2 x + 4}} =$
 (A) $\log\left[\tan x + \sqrt{\tan^2 x + 4}\right] + c$
 (B) $\frac{1}{2}\log\left[\tan x + \sqrt{\tan^2 x + 4}\right] + c$
 (C) $\log\left[\frac{1}{2}\tan x + \frac{1}{2}\sqrt{\tan^2 x + 4}\right] + c$
 (D) None of these
50. $\int \frac{2x \tan^{-1} x^2}{1+x^4} dx =$
 (A) $[\tan^{-1} x^2]^2 + c$ (B) $\frac{1}{2}[\tan^{-1} x^2]^2 + c$
 (C) $2[\tan^{-1} x^2]^2 + c$ (D) None of these
51. $\int \frac{1}{x^2 \sqrt{1+x^2}} dx =$
 (A) $-\frac{\sqrt{1+x^2}}{x} + c$ (B) $\frac{\sqrt{1+x^2}}{x} + c$
 (C) $-\frac{\sqrt{1-x^2}}{x} + c$ (D) $-\frac{\sqrt{x^2-1}}{x} + c$

52. $\int \frac{1}{(x^2 - 1)\sqrt{x^2 + 1}} dx =$
- (A) $\frac{1}{2\sqrt{2}} \log \left\{ \frac{\sqrt{1+x^2} + x\sqrt{2}}{\sqrt{1+x^2} - x\sqrt{2}} \right\} + c$
 (B) $\frac{1}{2\sqrt{2}} \log \left\{ \frac{\sqrt{1+x^2} - \sqrt{2}}{\sqrt{1+x^2} + \sqrt{2}} \right\} + c$
 (C) $\frac{1}{2\sqrt{2}} \log \left\{ \frac{\sqrt{1+x^2} - x\sqrt{2}}{\sqrt{1+x^2} + x\sqrt{2}} \right\} + c$
 (D) None of these
53. $\int \frac{\log(x + \sqrt{1+x^2})}{\sqrt{1+x^2}} dx =$
- (A) $\frac{1}{2} [\log(x + \sqrt{1+x^2})]^2 + c$
 (B) $\log(x + \sqrt{1+x^2})^2 + c$
 (C) $\log(x + \sqrt{1+x^2}) + c$
 (D) None of these
54. $\int e^x \sin(e^x) dx =$
- (A) $-\cos e^x + c$ (B) $\cos e^x + c$
 (C) $-\operatorname{cosec} e^x + c$ (D) None of these
55. $\int \frac{x^5 dx}{\sqrt{1+x^3}} =$
- (A) $\frac{2}{3} \sqrt{1+x^3} (x^3 + 2)$ (B) $\frac{2}{9} \sqrt{1+x^3} (x^3 - 4)$
 (C) $\frac{2}{9} \sqrt{1+x^3} (x^3 + 4)$ (D) $\frac{2}{9} \sqrt{1+x^3} (x^3 - 2)$
56. The value of $\int \frac{dx}{x\sqrt{x^4 - 1}}$ is
- (A) $\frac{1}{2} \sec^{-1} x^2 + k$ (B) $\log x \sqrt{x^4 - 1} + k$
 (C) $x \log \sqrt{x^4 - 1} + k$ (D) $\log \sqrt{x^4 - 1} + k$
57. $\int \frac{t}{e^{3t^2}} dt =$
- (A) $\frac{1}{6} e^{3t^2} + c$ (B) $-\frac{1}{6} e^{3t^2} + c$
 (C) $\frac{1}{6} e^{-3t^2} + c$ (D) $-\frac{1}{6} e^{-3t^2} + c$
58. If $\int \frac{1}{(1+x)\sqrt{x}} dx = f(x) + A$, where A is any arbitrary constant, then the function $f(x)$ is
- (A) $2 \tan^{-1} x$ (B) $2 \tan^{-1} \sqrt{x}$
 (C) $2 \cot^{-1} \sqrt{x}$ (D) $\log_e (1+x)$
59. $\int x \cos x^2 dx$ is equal to
- (A) $-\frac{1}{2} \sin^2 x + c$ (B) $\frac{1}{2} \sin^2 x + c$
 (C) $-\frac{1}{2} \sin x^2 + c$ (D) $\frac{1}{2} \sin x^2 + c$
60. $\int \frac{x^2 \tan^{-1} x^3}{1+x^6} dx$ is equal to
- (A) $\tan^{-1}(x^3) + c$ (B) $\frac{1}{6} (\tan^{-1} x^3)^2 + c$
 (C) $-\frac{1}{2} (\tan^{-1} x^3)^2 + c$ (D) $\frac{1}{2} (\tan^{-1} x^2)^3 + c$
61. $\int \frac{dx}{(a^2 + x^2)^{3/2}}$ is equal to
- (A) $\frac{x}{(a^2 + x^2)^{1/2}}$ (B) $\frac{x}{a^2 (a^2 + x^2)^{1/2}}$
 (C) $\frac{1}{a^2 (a^2 + x^2)^{1/2}}$ (D) None of these
62. $\int \frac{e^{m \tan^{-1} x}}{1+x^2} dx$ equals to
- (A) $e^{\tan^{-1} x}$ (B) $\frac{1}{m} e^{\tan^{-1} x}$
 (C) $\frac{1}{m} e^{m \tan^{-1} x}$ (D) None of these
63. $\int \frac{1 + \tan^2 x}{1 - \tan^2 x} dx$ equals to
- (A) $\log \left(\frac{1 - \tan x}{1 + \tan x} \right) + c$ (B) $\log \left(\frac{1 + \tan x}{1 - \tan x} \right) + c$
 (C) $\frac{1}{2} \log \left(\frac{1 - \tan x}{1 + \tan x} \right) + c$ (D) $\frac{1}{2} \log \left(\frac{1 + \tan x}{1 - \tan x} \right) + c$
64. The value of $\int \frac{2 dx}{\sqrt{1-4x^2}}$ is
- (A) $\tan^{-1}(2x) + c$ (B) $\cot^{-1}(2x) + c$
 (C) $\cos^{-1}(2x) + c$ (D) $\sin^{-1}(2x) + c$

65. $\int e^{3 \log x} (x^4 + 1)^{-1} dx =$

- (A) $\log(x^4 + 1) + c$ (B) $\frac{1}{4} \log(x^4 + 1) + c$
 (C) $-\log(x^4 + 1) + c$ (D) None of these

66. $\int \sqrt{\frac{1+x}{1-x}} dx =$

- (A) $-\sin^{-1} x - \sqrt{1-x^2} + c$
 (B) $\sin^{-1} x + \sqrt{1-x^2} + c$
 (C) $\sin^{-1} x - \sqrt{1-x^2} + c$
 (D) $-\sin^{-1} x - \sqrt{x^2-1} + c$

67. $\int \frac{x}{\sqrt{4-x^4}} dx =$

- (A) $\cos^{-1} \frac{x^2}{2}$ (B) $\frac{1}{2} \cos^{-1} \frac{x^2}{2}$
 (C) $\sin^{-1} \frac{x^2}{2}$ (D) $\frac{1}{2} \sin^{-1} \frac{x^2}{2}$

68. $\int \frac{\sin x dx}{3+4\cos^2 x} =$

- (A) $\log(3+4\cos^2 x) + c$
 (B) $\frac{-1}{2\sqrt{3}} \tan^{-1} \left(\frac{\cos x}{\sqrt{3}} \right) + c$
 (C) $\frac{-1}{2\sqrt{3}} \tan^{-1} \left(\frac{2 \cos x}{\sqrt{3}} \right) + c$
 (D) $\frac{1}{2\sqrt{3}} \tan^{-1} \left(\frac{2 \cos x}{\sqrt{3}} \right) + c$

69. The value of $\int \frac{dx}{\sqrt{x}(x+9)}$ is equal to

- (A) $\tan^{-1} \sqrt{x}$ (B) $\tan^{-1} \left(\frac{\sqrt{x}}{3} \right)$
 (C) $\frac{2}{3} \tan^{-1} \sqrt{x}$ (D) $\frac{2}{3} \tan^{-1} \left(\frac{\sqrt{x}}{3} \right)$

70. $\int \left\{ \frac{(\log x - 1)}{1 + (\log x)^2} \right\}^2 dx$ is equal to

- (A) $\frac{xe^x}{1+x^2} + c$ (B) $\frac{x}{(\log x)^2 + 1} + C$
 (C) $\frac{\log x}{(\log x)^2 + 1} + c$ (D) $\frac{x}{x^2 + 1} + c$

Integration by parts, Integral of the form
 $\int e^x (F(x) + F'(x)) dx$, Integral of the form
 $\int e^{kx} (kF(x) + F'(x)) dx$

71. $\int \log(x+1) dx =$

- (A) $(x+1) \log(x+1) - x + c$
 (B) $(x+1) \log(x+1) + x + c$
 (C) $(x-1) \log(x+1) - x + c$
 (D) $(x-1) \log(x+1) + x + c$

72. If $\int \ln(x^2 + x) dx = x \ln(x^2 + x) + A$, then $A =$

- (A) $2x + \ln(x+1) + \text{constant}$
 (B) $2x - \ln(x+1) + \text{constant}$
 (C) Constant
 (D) None of these

73. $\int x^2 \sin 2x dx =$

- (A) $\frac{1}{2} x^2 \cos 2x + \frac{1}{2} x \sin 2x + \frac{1}{4} \cos 2x + c$
 (B) $-\frac{1}{2} x^2 \cos 2x + \frac{1}{2} x \sin 2x + \frac{1}{4} \cos 2x + c$
 (C) $\frac{1}{2} x^2 \cos 2x - \frac{1}{2} x \sin 2x + \frac{1}{4} \cos 2x + c$
 (D) None of these

74. $\int \log x dx =$

- (A) $x + x \log x + c$ (B) $x \log x - x + c$
 (C) $x^2 \log x + c$ (D) $\frac{1}{x} \log x + x + c$

75. $\int \log_{10} x dx =$

- (A) $x \log_{10} x + c$
 (B) $x(\log_{10} x + \log_{10} e) + c$
 (C) $\log_{10} x + c$
 (D) $x(\log_{10} x - \log_{10} e) + c$

76. $\int [f(x)g''(x) - f''(x)g(x)] dx$ is equal to

- (A) $\frac{f(x)}{g'(x)}$
 (B) $f'(x)g(x) - f(x)g'(x)$
 (C) $f(x)g'(x) - f'(x)g(x)$
 (D) $f(x)g'(x) + f'(x)g(x)$

77. The value of $\int x \sin kx \, dx$ is

- (A) $\frac{\sin kx}{k} + c$
 (B) $\frac{\cos kx}{k} + c$
 (C) $\frac{\sin x}{k} + c$
 (D) $-\frac{x \cos kx}{k} + \frac{\sin kx}{k^2} + c$

78. $\int xe^x \, dx$ is equal to

- (A) $(x+1)e^x + c$ (B) $(x-1)e^x + c$
 (C) $xe^x + 1 + c$ (D) $xe^x - 1 + c$

79. $\int x^3 e^{x^2} \, dx =$

- (A) $\frac{1}{2}(x^2+1)e^{x^2} + c$ (B) $(x^2+1)e^{x^2} + c$
 (C) $\frac{1}{2}(x^2-1)e^{x^2} + c$ (D) $(x^2-1)e^{x^2} + c$

80. The value of $\int \frac{\log x}{(x+1)^2} \, dx$ is

- (A) $\frac{-\log x}{x+1} + \log x - \log(x+1)$
 (B) $\frac{\log x}{(x+1)} + \log x - \log(x+1)$
 (C) $\frac{\log x}{x+1} - \log x - \log(x+1)$
 (D) $\frac{-\log x}{x+1} - \log x - \log(x+1)$

81. $\int \frac{e^x(x-1)}{x^2} \, dx =$

- (A) $\frac{1}{x}e^x + c$ (B) $xe^{-x} + c$
 (C) $\frac{1}{x^2}e^x + c$ (D) $\left(x - \frac{1}{x}\right)e^x + c$

82. $\int e^x \left[\frac{1+x \log x}{x} \right] \, dx =$

- (A) $e^x + \log x + c$ (B) $\frac{e^x}{\log x} + c$
 (C) $e^x - \log x + c$ (D) $e^x \log x + c$

83. $\int e^x \left[\sin^{-1} \frac{x}{a} + \frac{1}{\sqrt{a^2 - x^2}} \right] \, dx =$

- (A) $\frac{1}{a}e^x \sin^{-1} \frac{x}{a} + c$ (B) $ae^x \sin^{-1} \frac{x}{a} + c$
 (C) $e^x \sin^{-1} \frac{x}{a} + c$ (D) $\frac{e^x}{\sqrt{a^2 - x^2}} + c$

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

- (A) $\left(\frac{x-1}{x+1}\right)e^x + c$ (B) $e^x \left(\frac{x+1}{x-1}\right) + c$
 (C) $e^x(x+1)(x-1) + c$ (D) None of these

85. $\int e^x \left(\frac{1}{x} - \frac{1}{x^2} \right) \, dx =$

- (A) $-\frac{e^x}{x^2} + c$ (B) $\frac{e^x}{x^2} + c$
 (C) $\frac{e^x}{x} + c$ (D) $-\frac{e^x}{x} + c$

86. $\int \sqrt{x}e^{\sqrt{x}} \, dx =$

- (A) $2\sqrt{x} - e^{\sqrt{x}} - 4\sqrt{x} e^{\sqrt{x}} + c$
 (B) $(2x - 4\sqrt{x} + 4)e^{\sqrt{x}} + c$
 (C) $(2x + 4\sqrt{x} + 4)e^{\sqrt{x}} + c$
 (D) $(1 - 4\sqrt{x})e^{\sqrt{x}} + c$

87. $\int 32x^3 (\log x)^2 \, dx$ is equal to

- (A) $x^4 \{8(\log x)^2 - 4(\log x) + 1\} + c$
 (B) $x^3 \{(\log x)^2 + 2 \log x\} + c$
 (C) $x^4 \{8(\log x)^2 - 4 \log x\} + c$
 (D) $8x^4 (\log x)^2 + c$

88. $\int \sin^{-1}(3x - 4x^3) \, dx =$

- (A) $x \sin^{-1} x + \sqrt{1-x^2} + c$
 (B) $x \sin^{-1} x - \sqrt{1-x^2} + c$
 (C) $2[x \sin^{-1} x + \sqrt{1-x^2}] + c$
 (D) $3[x \sin^{-1} x + \sqrt{1-x^2}] + c$

89. $\int \cos \sqrt{x} \, dx =$

- (A) $2[\sqrt{x} \sin \sqrt{x} + \cos \sqrt{x}] + c$
 (B) $2[\sqrt{x} \sin \sqrt{x} - \cos \sqrt{x}] + c$
 (C) $2[\cos \sqrt{x} - \sqrt{x} \sin \sqrt{x}] + c$
 (D) $-2[\sqrt{x} \sin \sqrt{x} + \cos \sqrt{x}] + c$

90. $\int \tan^{-1} \frac{2x}{1-x^2} \, dx =$

- (A) $x \tan^{-1} x + c$
 (B) $x \tan^{-1} x - \log(1+x^2) + c$
 (C) $2x \tan^{-1} x + \log(1+x^2) + c$
 (D) $2x \tan^{-1} x - \log(1+x^2) + c$

Integration of rational functions by using partial fractions, Evaluation of various forms of integration

91. $\int \frac{1}{x-x^3} \, dx =$

- (A) $\frac{1}{2} \log \frac{(1-x^2)}{x^2} + c$ (B) $\log \frac{(1-x)}{x(1+x)} + c$
 (C) $\log x(1-x^2) + c$ (D) $\frac{1}{2} \log \frac{x^2}{(1-x^2)} + c$

92. If $\int \sin 5x \cos 3x \, dx = -\frac{\cos 8x}{16} + A$, then $A =$

- (A) $\frac{\sin 2x}{16} + \text{constant}$
 (B) $-\frac{\cos 2x}{4} + \text{constant}$
 (C) Constant
 (D) None of these

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

- (A) $\frac{\cos^5 x}{5} - \frac{\cos^3 x}{3} + c$
 (B) $\frac{\cos^5 x}{5} + \frac{\cos^3 x}{3} + c$
 (C) $\frac{\sin^5 x}{5} - \frac{\sin^3 x}{3} + c$
 (D) $\frac{\sin^5 x}{5} + \frac{\sin^3 x}{3} + c$

94. $\int \sin 2x \cos 3x \, dx =$

- (A) $\frac{1}{2} \left(\cos x + \frac{1}{5} \cos 5x \right) + c$
 (B) $\frac{1}{2} \left(\cos x - \frac{1}{5} \cos 5x \right) + c$
 (C) $\cos x + \frac{1}{5} \cos 5x + c$
 (D) $\cos x - \frac{1}{5} \cos 5x + c$

95. $\int \frac{\cos x}{(1+\sin x)(2+\sin x)} \, dx =$

- (A) $\log[(1+\sin x)(2+\sin x)] + c$
 (B) $\log \frac{2+\sin x}{1+\sin x} + c$
 (C) $\log \frac{1+\sin x}{2+\sin x} + c$
 (D) None of these

96. $\int \frac{dx}{1+3\sin^2 x} =$

- (A) $\frac{1}{3} \tan^{-1}(3 \tan^2 x) + c$ (B) $\frac{1}{2} \tan^{-1}(2 \tan x) + c$
 (C) $\tan^{-1}(\tan x) + c$ (D) None of these

97. $\int \frac{dx}{2x^2+x+1}$ equals

- (A) $\frac{1}{\sqrt{7}} \tan^{-1} \left(\frac{4x+1}{\sqrt{7}} \right) + c$
 (B) $\frac{1}{2\sqrt{7}} \tan^{-1} \left(\frac{4x+1}{\sqrt{7}} \right) + c$
 (C) $\frac{1}{2} \tan^{-1} \left(\frac{4x+1}{\sqrt{7}} \right) + c$
 (D) None of these

98. $\int \frac{dx}{7+5\cos x} =$

- (A) $\frac{1}{\sqrt{6}} \tan^{-1} \left(\frac{1}{\sqrt{6}} \tan \frac{x}{2} \right) + c$
 (B) $\frac{1}{\sqrt{3}} \tan^{-1} \left(\frac{1}{\sqrt{3}} \tan \frac{x}{2} \right) + c$
 (C) $\frac{1}{4} \tan^{-1} \left(\tan \frac{x}{2} \right) + c$
 (D) $\frac{1}{7} \tan^{-1} \left(\tan \frac{x}{2} \right) + c$

99. $\int \frac{dx}{x^2 + 4x + 13}$ is equal to

(A) $\log(x^2 + 4x + 13) + c$

(B) $\frac{1}{3} \tan^{-1} \left(\frac{x+2}{3} \right) + c$

(C) $\log(2x + 4) + c$

(D) $\frac{2x + 4}{(x^2 + 4x + 13)^2} + c$

100. $\int \frac{dx}{\cos x - \sin x}$ is equal to

(A) $\frac{1}{\sqrt{2}} \log \left| \tan \left(\frac{x}{2} + \frac{3\pi}{8} \right) \right| + c$

(B) $\frac{1}{\sqrt{2}} \log \left| \cot \left(\frac{x}{2} \right) \right| + c$

(C) $\frac{1}{\sqrt{2}} \log \left| \tan \left(\frac{x}{2} - \frac{3\pi}{8} \right) \right| + c$

(D) $\frac{1}{\sqrt{2}} \log \left| \tan \left(\frac{x}{2} - \frac{\pi}{8} \right) \right| + c$