

## TOPIC: "INDEFINITE INTEGRATION"

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1. If  $x = \phi(t)$  is a differentiable function of "t" then prove that

$$\int f(x) dx = \int f[\phi(t)] \phi'(t) dt.$$

2. Prove the following (a)  $\int [f(x)]^n f'(x) dx = \frac{[f(x)]^{n+1}}{n+1} + C, n \neq -1$

(b)  $\int \frac{f'(x)}{f(x)} dx = \log |f(x)| + c$

(c)  $\int \frac{f'(x)}{\sqrt[n]{f(x)}} dx = \frac{[f(x)]^{1-\frac{1}{n}}}{1-\frac{1}{n}} + c, n \neq 1$

3. Prove that :

$$\int e^x [f(x) + f'(x)] dx = e^x \cdot f(x) + c \text{ and hence find } \int e^x (\cot x - \operatorname{cosec}^2 x) dx$$

4. If  $u$  and  $v$  are differentiable function of  $x$ , then prove that :

$$\int u \cdot v dx = u \int v dx - \int \left[ \frac{du}{dx} \cdot \int v dx \right] dx$$

5. Prove that  $\int \sqrt{x^2+a^2} dx = \frac{x}{2} \sqrt{x^2+a^2} + \frac{a^2}{2} \log(x + \sqrt{x^2+a^2}) + c$

6. Prove that  $\int \sqrt{x^2-a^2} dx = \frac{x}{2} \sqrt{x^2-a^2} - \frac{a^2}{2} \log |x + \sqrt{x^2-a^2}| + c$

7. Prove that  $\int \sqrt{a^2-x^2} dx = \frac{x}{2} \sqrt{a^2-x^2} + \frac{a^2}{2} \sin^{-1}\left(\frac{x}{a}\right) + c$

8. Evaluate:  $\int \frac{dx}{\sin(x-a) \sin(x-b)}$

9. Evaluate:  $\int \sin^3 x \cos x dx$

10. Evaluate:  $\int \log x dx$

11. Evaluate :  $\int \frac{dx}{x + \sqrt{x}}$

12. Evaluate :  $\int \frac{dx}{x + \sin x}$

13. Evaluate :  $\int \sin(\log x) dx$

14. Evaluate :  $\int \frac{x dx}{(x-1)(x^2+1)}$

15. Evaluate:  $\int \frac{\log x}{(1 + \log x)^2} dx$

16. Evaluate:  $\int \frac{1}{x(x-1)} dx$

17.  $\int \sec^n x \tan x dx$

18. Evaluate:  $\int \frac{dx}{\sin^2 x + 5 \sin x \cos x + 2}$

19. Evaluate:  $\int \frac{\log x}{(1 + \log x)^2} dx$

20. Integrate  $\sec^3 x$  w.r.t  $x$

21. Evaluate :  $\int \frac{x^{e-1} + e^{x-1}}{x^e + e^x} dx$

22. Evaluate :  $\int \frac{dx}{\cos x(2 + \sin x)}$

23. Evaluate:  $\int e^x \frac{\log(\sin e^x)}{\tan e^x} dx$

24. Evaluate:  $\int \frac{2x}{(x+5)^2} dx$

25. Evaluate:  $\int \cos \sqrt{x} dx$

26. Evaluate :  $\int \frac{dx}{\sqrt{x^2 + 6x + 5}}$

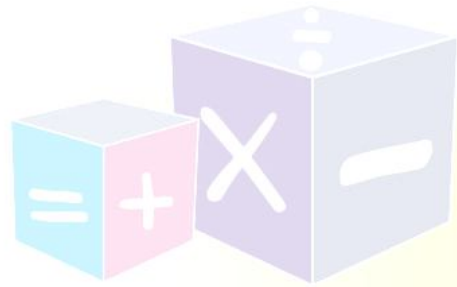
27. Evaluate :  $\int \frac{(\sin^{-1} x)^3}{\sqrt{1-x^2}} dx$

28. Evaluate:  $\int x \log x dx$

29. Evaluate:  $\int \frac{1}{5 + 4 \cos x} dx$

30. Evaluate:  $\int \frac{1}{a^2 e^x + b^2 e^{-x}} dx$

31. Evaluate:  $\int \frac{\sin(x-a)}{\sin x} dx$



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32. Evaluate:  $\int \frac{x dx}{(x-1)(x^2+1)}$

33. Evaluate :  $\int \frac{\sin(x-a)}{\sin(x+a)} dx$

34. Evaluate :  $\int \frac{x dx}{(x+1)^2(x+2)}$

35. Evaluate:  $\int \frac{x^2}{(x^2+2)(2x^2+1)} dx$

36. Evaluate :  $\int \frac{dx}{\sqrt{x+x}}$

37. Evaluate :  $\int x \sec^2 x dx$

38. Evaluate :  $\int \frac{1}{3+5 \cos x} dx$

39. Evaluate :  $\int \frac{dx}{\sqrt{\sin^3 x \sin(x+a)}}$

40. Evaluate :  $\int \frac{e^x}{\sqrt{2e^{2x}+7e^x-5}} dx$

41. Evaluate :  $\int \frac{x^2+37}{(x^2-7)(x^2+4)} dx$

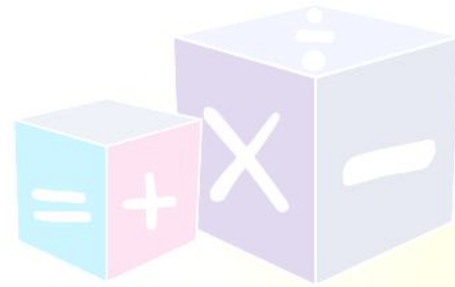
42. Evaluate :  $\int \frac{5x+2}{x^2-3x+2} dx$

43. Evaluate :  $\int \frac{dx}{\sin^2 x \cdot \cos^2 x}$

44. Evaluate :  $\int \operatorname{cosec}^3 x dx$

45. Evaluate :  $\int \frac{dx}{3 \sin x + 4 \cos x + 5}$

46. Evaluate :  $\int \frac{dx}{2x + 3x \log x}$



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47. Evaluate :  $\int \frac{\sec^2(\log x)}{x} dx$

48. Evaluate :  $\int \frac{dx}{1 + \cos 2x}$

49. Evaluate :  $\int \frac{\sin x}{\cos(x-a)} dx$

50. Evaluate :  $\int \log x dx$

51. Evaluate :  $\int \frac{dx}{(x-1)^2(x+1)}$

52.  $\int \frac{1}{x} \cdot \log x dx = \dots\dots\dots$

(a)  $\log(\log x) + c$

(b)  $\frac{1}{2}(\log x)^2 + c$

(c)  $2 \log x + c$

(d)  $\log x + c$

53.  $\int \frac{1}{1 + \cos x} dx = \dots\dots$

(a)  $\tan\left(\frac{x}{2}\right) + c$

(b)  $2 \tan\left(\frac{x}{2}\right) + c$

(c)  $-\cot\left(\frac{x}{2}\right) + c$

(d)  $-2 \cot\left(\frac{x}{2}\right) + c$

