MATHS

BOOKS - CHHAYA PUBLICATION MATHS (BENGALI ENGLISH)

INTEGRALS OF SOME SPECIAL FORM OF FUNCTIONS

Example 1

1. Integrate : $\int \sin^5 x dx$

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Example 2

1. Evaluate : $\int \cos^3 2x dx$

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Example 3

1. Integrate : $\int \sin^4 x dx$

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Example 4

1. Integrate : $\int \frac{\sqrt{\sin x}}{\cos^{\frac{9}{2}} x} dx$

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Example 7

1. Integrate : $\int \sec^6 x dx$

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Example 8

1. Evaluate : $\int \operatorname{cosec}^4 x dx$

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Example 9

1. Integrate : $\int \sec^5 x dx$

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Example 10

1. $\int \cos ec^3 x dx$

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Example 11

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

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Example 12

1. Evaluate : $\int \frac{dx}{4 + 5\sin^2 x}$

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Example 13

1. Integrate: $\int \frac{dx}{3\sin x - 4\cos x}$

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Example 14

1. Integrate: $\int \frac{\sin x}{\sin x - \cos x} dx$

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Example 15

1. Evaluate : $\int \frac{2\cos x + 3\sin x}{3\cos x + 2\sin x} dx$

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Example 16

1. Integrate: $\int \frac{2x^2 - 3x + 9}{x^2 + 4x - 5} dx$

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Example 17

1. Example: $\int \frac{2x + 3}{x^2 + x^2 - 2x} dx$

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Example 18

1. Integrate: $\int \frac{x^3}{(x-1)(x-2)(x-3)} dx$

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Example 19

1. Integrate: $\int \frac{5x^2+1}{(x+1)^2(2x-1)} dx$

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Example 20

1. Evaluate: $\int \frac{dx}{x^2\sqrt{x+1}}$

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Example 21

1. Integrate : $\int \frac{dx}{1+x^3}$

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Iiiustrative Examples

1. Integrate : (i) $\int \sin^3 x \cos^5 x dx$

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2. Integrate : $\int \cos^3 x \sin^4 x dx$

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3. Integrate: $\int \sin^2 x \cos^4 x dx$

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

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5. Evaluate : $\int \frac{(x-l)(x-m)}{(x-a)(x-b)} dx$

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6. Integrate: $\int \frac{x^2}{2x^4 - 7x^2 - 4} dx$

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7. Evaluate : $\int \frac{x^3}{x^4 + x^2 - 12} dx$

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8. Evaluate : $\int \frac{x^2 dx}{x^6 - 6x^3 + 5}$

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9. Evaluate: $\int \frac{x^4 + 1}{x^6 + 1} dx$

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10. Evaluate: $\int \frac{\sin x dx}{\sin^3 x + \cos^3 x}$

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Mcq

1. To evaluate $\int \sin^5 x dx$ we put -

A. sin x = z

B. cosx = z

C. tan x = z

D. $\tan^2 x = z$

Answer: C

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2. To evaluate $\int \operatorname{cosec}^5 x dx$ we put

A. cot x = z

B. cosecx cot x = z

C. cot x = z

D. none of these

Answer: D

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3. To evaluate $\int \sin^4 x \cos^3 x dx$ we put

A. sin x = z

B. cosx = z

C. tan x = z

D. none of these

Answer: A

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4. Evaluate: $\int \sin^{-\frac{11}{3}} x \cos^{\frac{5}{3}} x dx$

A. (m +n) is a negative integer

B. (m + n) is a negative even integer

C. (m + n) is a negative integer

D. (m + n) is a positive even integer

Answer: B

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5. To evaluate $\int \cos^5 x dx$ we put

A. cos x = z

B. sin x = z

C. sec x = z

D. tan x = z

Answer: B

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6. Evaluate $\int \tan^3 x dx$

A. $\frac{1}{2}\tan^2 x + \log|\sec x| + c$

B. $\tan^2 x - \log|\sec x| + c$

C. $\frac{1}{2}\tan^2 x - \log|\sec x| + c$

D. $\frac{1}{2}\tan^2 x - \log|\cos x| + c$

Answer: C

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7. The value of $\int \sin^2 x \cos^3 x dx$ is

A. $\frac{1}{3}\cos^3 x - \frac{1}{5}\cos^5 x + c$

B. $\frac{1}{5}\cos^5 x - \frac{1}{3}\cos^3 x + c$

C. $\frac{1}{3}\sin^3 x - \frac{1}{5}\sin^5 x + c$

D. $\frac{1}{5}\sin^5 x - \frac{1}{3}\sin^3 x + c$

Answer: C

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8. The value of $\int \text{cosec}^4 x dx$ is-

A. $-\cot x + \frac{1}{3}\cot^3 x + c$

B. $\cot x + \frac{1}{3}\cot^3 x + c$

C. $\cot x - \frac{1}{3}\cot^3 x + c$

D. $-\left(\cot x + \frac{1}{3}\cot^3 x\right) + c$

Answer: D

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9. The value of $\int \cos^3 x dx$ is

A. $\frac{1}{3}\sin^3 x - \sin x + c$

B. $\sin x - \frac{1}{3}\sin^3 x + c$

C. $\cos x - \frac{1}{3}\cos^3 x + c$

D. $\frac{1}{3}\cos^3 x - \cos x + c$

Answer: B

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10. The value of $\int \sin^3\left(\frac{x}{2}\right)dx$ is

A. $\frac{2}{3}\cos^3\frac{x}{2} - 2\cos\frac{x}{2} + c$

B. $2\cos\frac{x}{2} - \frac{2}{3}\cos^3\frac{x}{2} + c$

C. $\frac{1}{2}\cos\frac{x}{2} - \frac{1}{6}\cos^3\frac{x}{2} + c$

D. $\frac{1}{6}\cos^3\frac{x}{2} - \frac{1}{2}\cos\frac{x}{2} + c$

Answer: A

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Very Short Answer Type Questions

1. $\int \cos^5 x dx$

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2. $\int \sin^3 x dx$

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3. Evaluate the following integrals :

$\int \cos^4 x dx$

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4. $\int \sin^2 x \cos^2 x dx$

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5. $\int \sin^5 \frac{x}{2} dx$

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6. $\int \sin^2 x \cos^5 x dx$

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7. $\int \sin^3 x \cos^2 x dx$

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8. $\int \cos^2 x \sin^3 x dx$

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9. Evaluate: $\int \sin^3 x \cos^5 x dx$

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10. $\int \sin^4 x \cos^4 x dx$

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11. Evaluate: $\int \sin^3 x \cos^5 x dx$

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12. $\int \sin 2x \sin^4 x dx$

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Short Answer Type Question

1. $\int \cos 2x . \sin^3 x dx$

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2. $\int \sqrt{\sin x} \cos^3 dx$

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3. $\int \frac{\sin x dx}{\cos 2x}$

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4. $\int \frac{\sin^2 x dx}{\cos^6 x}$

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5. $\int \frac{dx}{\sqrt{\sin x}. \cos^{\frac{7}{2}} x}$

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6. $\int \frac{\cos^2 x}{\sin^4 x} dx$

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7. $\int \frac{\sin^2 \theta d\theta}{(1+\cos\theta)^2}$

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8. $\int \tan^3 x dx$

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9. $\int \cot^4 x dx$

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10. $\int \cot^5 x dx$

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11. $\int \tan^6 x dx$

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12. $\int \sec^4 x dx$

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13. $\int \operatorname{cosec}^6 x dx$

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14. $\int \sec^3 x dx$

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15. $\int \operatorname{cosec}^5 x dx$

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16. $\int \tan^2 x \sec^4 x dx$

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17. $\int \frac{\cos x}{\cos 2x} dx$

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18. $\int \left(\frac{\cot x}{\sin x} \right)^4 dx$

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19. $\int \frac{\sin^3 x dx}{\cos^{\frac{2}{5}} x}$

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20. $\int \frac{dx}{\sin^4 x \cos^4 x}$

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21. $\int \frac{dx}{1 + \sin 2x}$

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22. $\int \frac{dx}{1+\cos^2 x}$

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23. $\int \frac{dx}{b^2 \sin^2 x + a^2 \cos^2 x}$

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24. $\int \frac{dx}{2\sin^2 x + \cos^2 x}$

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25. Evaluate $\int \frac{dx}{\sin x \cos x}$

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26. $\int \frac{\sin x dx}{\sin 3x}$

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27. $\int \frac{\cos x dx}{\cos 3x}$

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28. $\int \frac{dx}{5 + 4\cos x}$

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29. $\int \frac{dx}{5 + 4\sin x}$

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30. $\int \frac{dx}{3 + 2\sin x + \cos x}$

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31. $\int \frac{x dx}{(x+1)(2x+1)}$

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32. $\int \frac{(x-1)dx}{(x+2)(x-3)}$

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33. $\int \frac{(x-1)dx}{6x^2 + x - 1}$

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34. $\int \frac{dx}{(x-a)(x-b)}$

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35. $\int \frac{xdx}{(x-a)(x-b)}$

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36. $\int \frac{(x+2)dx}{x^2-3x+2}$

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37. Find $\int \frac{x^2+x+1}{(x+2)(x^2+1)}dx$

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38. $\int \frac{(7x+5)dx}{x^3+2x^2-x-2}$

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

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40. $\int \frac{x^2dx}{(x-a)(x-b)(x-c)}$

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41. $\int \frac{(2x+1)dx}{x(x+1)(x+2)}$

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42. $\int \frac{(x^2 - 3)\,dx}{x^3 - 7x + 6}$

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43. $\int \frac{(3x^2 - 1)\,dx}{x^2 - 3x + 2}$

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44. $\int \frac{(x - 1)(x - 2)}{(x - 3)(x - 4)}\,dx$

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45. $\int \frac{x^2 dx}{x^2 + 7x + 12}$

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46. $\int \frac{x^3 dx}{(x-a)(x-b)(x-c)}$

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47. $\int \frac{x^3 dx}{x^2 - 4x + 3}$

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

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49. $\int \frac{dx}{x^3 + x^4}$

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50. $\int \frac{dx}{(x^2-4)^2}$

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

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52. Evaluate: $\int \frac{dx}{x^{\frac{2}{3}}\left(1+x^{\frac{2}{3}}\right)}$

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

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54. $\int \frac{dx}{x}$

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55. $\int \frac{x\,dx}{(x-1)(x^2+4)}$

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56. $\int \frac{dx}{(x-1)^{\frac{3}{2}}(x+1)^{\frac{1}{2}}}$

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57. $\int \frac{x^3+3x+2}{(x^2+1)^2(x+1)}dx$

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58. $\int \frac{4e^x + 6e^{-x}}{9e^x - 4e^{-x}} dx$

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Long Answer Type Questions

1. Integrate :

$$\int \frac{\sin 2x dx}{\sin^4 x + \cos^4 x}$$

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2. $\int \frac{\sin 2x dx}{(\sin x + \cos x)^2}$

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3. $\int \frac{\cos x dx}{\sin x + \cos x}$

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4. $\int \frac{\sin x dx}{\sin x + \cos x}$

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5. $\int \frac{dx}{3 + \sin^2 x}$=?

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6. $\int \sqrt{1 + \sec x dx}$

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7. $\int \frac{\cos x + 2\sin x}{3\cos x + 4\sin x} dx$

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8. $\int \frac{dx}{1-\sin^4 x}$

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9. $\int \frac{dx}{\cos 3x - \cos x}$

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10. $\int \frac{\cos x - \sin x}{\sqrt{\sin 2x}} dx$

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11. $\int \frac{dx}{1+\tan x}$

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12. $\int \frac{\tan x}{1+\tan x} dx$

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13. $\int \frac{\sin x dx}{\sqrt{1-\sin x}}$

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14. $\int \frac{dx}{(1+x^2)^{\frac{7}{2}}}$

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15. $\int \frac{\cos^4 \theta}{\sin \theta} d\theta$

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16. $\int \frac{\sin^3 \theta d\theta}{\sqrt{\cos \theta}}$

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17. $\int \sec^{\frac{8}{9}} x \operatorname{cosec}^{\frac{10}{9}} x dx$

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18. $\int \operatorname{cosec}^{\frac{2}{3}} x \cos^3 x dx$

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19.

$$\int \frac{dx}{1 - \cos \alpha \cos x} \left(0 < \int \frac{dx}{1 - \cos \alpha \cos x} \left(0 \leq \alpha \leq \frac{\pi}{2}\right) \alpha \leq \frac{\pi}{2}\right)$$

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20. $\int \frac{dx}{\cos x + \cos \alpha}$

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

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22. $\int \frac{dx}{1-x^3}$

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23. $\int \frac{dx}{x^2+a^2}(x+b)$

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24. $\int \frac{x^3 dx}{(x+a)(x^2+a^2)}$

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25. $\int x \frac{dx}{x^2+a^2(x^2+b^2)}$

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26. $\int \frac{x^2 dx}{x^2+a^2(x^2+b^2)}$

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27. $\int \frac{x^2 dx}{x^4+1}$

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28. $\int \frac{x^3 + 3x + 2}{(x^2 + 1)^2 (x + 1)} dx$

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29. $\int \frac{x^4 dx}{(x^2 + a^2)(x^2 + b^2)}$

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30. $\int \frac{\cos \theta d\theta}{\sin^2 \theta - 5 \sin \theta}$

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31. $\int \frac{e^x dx}{e^{2x} + e^x - 2}$

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32. $\int \frac{\cos\theta d\theta}{(1-\sin\theta)(2-\sin\theta)}$

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33. Evaluate : $\int \frac{x dx}{2x^4 - 3x^2 - 2}$

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34. $\int \frac{x^2 dx}{x^6 - 5x^3 + 6}$

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35. $\int \frac{(x^2 - 1) dx}{x^4 + x^2 + 1}$

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36. $\int \frac{dx}{x(x^4-1)}$

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37. Write True or False

Simplified value of $(\sec\theta+\tan\theta)(1-\sin\theta)$ is $\cos\theta$,

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

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39. $\int \frac{dx}{x^4+x^2+1}$

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40. $\int \frac{dx}{x(a+bx^n)^2}$

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41. $\int \frac{dx}{\sin(x-a)\sin(x-b)}$

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42. $\int \frac{dx}{\sin 2x - \sin x}$

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Multiple Correct Answers Type

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

A. $\sqrt{1-x}\left(\sqrt{x}-2\right)-\sin^{-1}\sqrt{x}+c$

B. $\sqrt{1-x}\left(\sqrt{x}-2\right)+\sin^{-1}\sqrt{x}+c$

C. $\sqrt{1-x}\left(\sqrt{x}-2\right)+\cos^{-1}\sqrt{x}+c$

D. $\sqrt{1-x}\left(\sqrt{x}-2\right)-\cos^{-1}\sqrt{x}+c$

Answer: A::C

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2. $\int\frac{\sin x}{\sin 4x}dx$

A. $\frac{1}{8}\log\left|\frac{1+\sin x}{1-\sin x}\right|+\frac{1}{4\sqrt{2}}\log\left|\frac{1+\sqrt{2}\sin x}{1-\sqrt{2}\sin x}\right|+c$

B. $\frac{1}{8}\log\left|\frac{1-\sin x}{1+\sin x}\right|+\frac{1}{4\sqrt{2}}\log\left|\frac{1+\sqrt{2}\sin x}{1-\sqrt{2}\sin x}\right|+c$

C. $-\frac{1}{8}\log\left|\frac{1+\sin x}{1-\sin x}\right|+\frac{1}{4\sqrt{2}}\log\left|\frac{1+\sqrt{2}\sin x}{1-\sqrt{2}\sin x}\right.+c$

D. $-\frac{1}{8}\log\left|\frac{1+\sin x}{1-\sin x}\right|-\frac{1}{4}\sqrt{2}\log\left|\frac{1+\sqrt{2}\sin x}{1-\sqrt{2}\sin x}\right|+c$

Answer: B::C

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3. if $I = \int \frac{x^2 + 20}{(x \sin x + 5 \cos x)^2} dx$,then I equals-

A. $-\frac{x}{\cos x(x \sin + 5 \cos x)} + \tan x + c$

B. $\frac{x}{\sin x(x \sin + 5 \cos x)} + \cot x + c$

C. $(x \sin x - 5 \cos x)^{-1} \sin x + 7x + c$

D. $-x \sec x(x \sin x + 5 \cos x)^{-1} + \cot\left(\frac{\pi}{2} - x\right) + c$

Answer: A::D

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4. $\int \frac{\cot x}{\sqrt{a + b \cot^2 x}} dx (0 < a < b)$,

A. $\sqrt{b} - a \sin^{-1}\left(\sqrt{b - a} \sin x\right) + c$

B. $\frac{1}{\sqrt{b-a}}\sin^{-1}\left(\sqrt{\frac{b-a}{b}}\sin x\right)+c$

C. $-\frac{1}{\sqrt{b-a}}\cos^{-1}\left(\sqrt{\frac{b-a}{b}}\sin x\right)+c$

D. $\sin^{-1}\left(\sqrt{b-a}x\right)+c$

Answer: B::C

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5.

if $\int\cos^7 x dx = A\sin^7 x + B\sin^5 x + C\sin^3 x + \sin x + k, then -$

A. $A = \frac{1}{7}$

B. $A = \frac{1}{7}$

C. $B = \frac{1}{5}$

D. $B = \frac{3}{5}$

Answer: B::D

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Integer Answer Type

1. if $\int \frac{dx}{4+5\sin^2 x} = \frac{1}{k}\tan^{-1}\left(\frac{3}{2}\tan x\right) + c,$ then the value of k is -

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2. $\int \frac{x^2}{2x^4 - 7x^2 - 4} dx$

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3. if $\int \operatorname{cosec}^{\frac{2}{3}} x \cos^3 x dx = k(\sin x)^{\frac{1}{3}} - \frac{3}{7}(\sin x)^{\frac{7}{3}} + c$ then the value of k is -

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4. if $\int \frac{x+2}{x^2-3x+2}dx = A\log|x-2| - 3\log|x-1| + 3$ then the valueof A is-

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5. if $\int \frac{dx}{e^x(e^x+1)^2} = \frac{2e^x+1}{e^x(e^x+1)} + k\log|1+e^{-x}| + c$ then the value of k is -

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Comprehension Type

1. $\int \frac{dx}{(x-3)\sqrt{x}}$

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2. $\int \frac{\sqrt{x}}{x+2} dx$

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3. $\int \frac{dx}{(x-1)\sqrt{2x+3}}$

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4. $\int \frac{dx}{\sqrt{5+x^2}}$

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5. $\int \frac{dx}{\sqrt{2-x^2}}$

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6. $\int \frac{dx}{\sqrt{3+4x^2}}$

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