MATHS

BOOKS - KC SINHA MATHS (HINGLISH)

INDEFINITE INTEGRALS - FOR COMPETITION

Solved Examples

1. Evaluate $\int \sin^2 x \cos^5 x dx$

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2. Evaluate $\int \cos^5 \left(\frac{x}{2}\right) \sin x dx$

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

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4. Evaluate: $\int \frac{\sqrt{\tan x}}{\sin x \cos x} dx$

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5. Evaluate: $\int \sin^4 x \cos^2 x dx$

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

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7. Evaluate $\int \sec^6 x dx$ [Here power of $\sec x$ is even positive integer]

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8. Evaluate $\int \cot^5 x dx$

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9. Evaluate: $\int \cot^m x \cos ec^4 x dx$

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10. Evaluate: $\int \tan^3 2x . \sec 2x dx$

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11. Evaluate $\int \tan^4 x dx$

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12. Evaluate: $\int \sqrt{1 + 2\cot x(\cot x + \cos ecx)}dx$

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13. Evaluate: $\int \tan(x + \alpha)\tan(2x - \alpha)\tan 3x dx$

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

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15. Evaluate $\int \left(\frac{x^{\frac{1}{2}}}{x^{1/2} - x^{1/3}}\right)dx$

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16. Evaluate $\int \frac{dx}{\sqrt{1+x}+(1+x)^{\frac{1}{3}}}$

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17. Evaluate: $\int \frac{x}{(1+x)^{\frac{1}{3}}-\sqrt{1+x}}dx$

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18. Evaluate: $\int \frac{\log\left(1+\frac{1}{x}\right)}{x(1+x)}dx$

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19. Evaluate: $\int \frac{1+2x\sin x-\cos x}{x(1-\cos x)}dx$

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20. Evaluate: $\int \frac{3+2\cos x}{(2+3\cos x)^2}dx$

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21. Evaluate $\int \frac{\sin^3 x}{(1+\cos^2 x)\sqrt{1+\cos^2 x+\cos^4 x}}dx$

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22. $\int \frac{dx}{\sqrt{\sin^3 x \sin(x+\alpha)}}$

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23. Evaluate: $\int \frac{x^2-1}{x^3\sqrt{2x^4-2x^2+1}}dx$

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24. Evaluate: for $m \in N$,

$$\int x^{3m} + x^{2n} + x^m \Big) \left(2x^{2m} + 3x^m + 6\right)^{\frac{1}{m}} dx, x > 0$$

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25. Evaluate: $\int (\sin x)^{\cos x} \left[\cos x \cot x - \log(\sin x)^{\sin x}\right] dx$

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26. Evaluate: $\int \frac{dx}{\cos x + \cos ecx}$

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27. Evaluate: $\int \frac{(1 + \log x)^2}{1 + \log x^{x+1} + \left(\log x^{\sqrt{x}}\right)^2} dx$

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28. Evaluate: $\int \frac{x\cos\alpha + 1}{(x^2 + 2x\cos\alpha + 1)^{\frac{3}{2}}}$

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29. Evaluate: $\int \frac{\sin^3 x}{(\cos^4 x + 3\cos^2 x + 1)\tan^{-1}(\sec x + \cos x)} dx$

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30. Evaluate: $\int \frac{x^{-\frac{7}{6}} - x^{\frac{5}{6}}}{x^{\frac{1}{3}}(x^2 + x + 1)^{\frac{1}{2}} - x^{\frac{1}{2}}(x^2 + x + 1)^{\frac{1}{3}}} dx$

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31. Evaluate: $\int \frac{\sqrt{\cot x} - \sqrt{\tan x}}{1 + 3\sin 2x} dx$

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32. Evaluate: $\int \frac{dx}{\sqrt{\sin(x+\alpha)\cos^3(x-\beta)}}$

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33. Evaluate: $\int \frac{\sin 2x\left(1-\frac{3}{2}\cos x\right)}{e^{\sin^2 x+\cos^3 x}}dx$

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34. If

$\int(\sin 3\theta+\sin\theta)e^{\sin\theta}\cos\theta d\theta=\left(A\sin^3\theta+B\cos^2\theta+C\sin\theta+D\cos\theta+\right.$

+F then find the values of A B C D E

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35. Evaluate: $\int \frac{\cos x(1+4\cos 2x)}{\sin x+4\sin x\cos^2 x}dx$

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36. Evaluate: $\int\left(x+\frac{1}{x}\right)^{n+5}\left(\frac{x^2-1}{x^2}\right)dx$

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37. If $\int\frac{\left(\sqrt{x}\right)^5}{\left(\sqrt{x}\right)^7+x^6}dx=a\log\left(\frac{x^k}{1+x^k}\right)+c$ then a and k are

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38. Evaluate: $\int\frac{x+x^{\frac{2}{3}}+x^{\frac{1}{6}}}{x\left(1+x^{\frac{1}{3}}\right)}.\,dx$

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39. Evaluate: $\int\frac{dx}{\cos^6 x+\sin^6 x}$

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40. Evaluate: $\int \frac{dx}{(5+4\cos x)^2}$

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41. Evaluate: $\int \frac{\cos\theta}{(5+4\cos\theta)^2} d\theta$

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42. Evaluate: $\int \frac{a+b\cos x}{(b+a\cos x)^2} dx$

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43. Evaluate: $\int \frac{\sin^3\left(\frac{\theta}{2}\right)}{\cos\left(\frac{\theta}{2}\right)\sqrt{\cos^3\theta+\cos^2\theta+\cos\theta}} d\theta$

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44. Evaluate: $\int \frac{x^2 - 1}{x\sqrt{(x^2 + \alpha x + 1)(x^2 + \beta x + 1)}} dx$

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45. Evaluate: $\int \frac{1 - x^2}{1 + x^2} \cdot \frac{dx}{\sqrt{1 + x^4}}$

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46. Evaluate: $\int \frac{(x - 1)\sqrt{x^4 + 2x^3 - x^2 + 2x + 1}}{x^2(x + 1)} dx$

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47. Evaluate: $\int \frac{\tan\left(\frac{\pi}{4} - x\right)}{\cos^2 x\sqrt{\tan^3 x + \tan^2 x + \tan x}} dx$

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48. The value of $\int \sqrt{\frac{\sin x - \sin^3 x}{1 - \sin^3 x}} dx$ is equal to (A) $\sin^{-1} \sin^{\frac{3}{2}} x + C$ (B) $\frac{2}{3} \sin^{-1}\left(\sin^{\frac{3}{2}} x\right) + C$ (C) $-\frac{2}{3} \cos^{-1}\left(\sin^{\frac{3}{2}} x\right) + C$ (D) none of these

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

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50. Evaluate: $\int \frac{2x + 3}{\sqrt{x^2 + x + 1}} dx$

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51. Evaluate: $\int \frac{3x^2 + 2x + 1}{x^2 + x + 1} dx$

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52. Evaluate: $\int \sqrt{\cos ec^2 x - 2} dx$

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53. Evaluate: $\int \frac{\sqrt{\cos 2x}}{\sin x} dx$

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54. Evaluate: $\int \frac{1 + x^2}{\left(\frac{1}{x} - x\right)\sqrt{1 + x^2 + x^4}} dx$

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55. Evaluate: $\int e^{\tan \theta} (\sec \theta - \sin \theta) d\theta$

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

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57. Evaluate: $\int e^x \left(\frac{2\tan x}{1+\tan x} + \cot^2\left(x+\frac{\pi}{4}\right)\right) dx$

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58. Evaluate: $\int e^x . \frac{x^3 - x + 2}{(x^2+1)^2} dx$

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59. Evaluate: $\int \left(3x^2 \tan\left(\frac{1}{x}\right) - x\sec^2\left(\frac{1}{x}\right)\right) dx$

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60. Evaluate: $\int \frac{x^2 + n(n-1)}{(x\sin x + n\cos x)^2} dx$

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61. If $\cos\theta > \sin\theta > 0$, then evaluate:

$$\int\left\{\log\left(\frac{1+\sin 2\theta}{1-\sin 2\theta}\right)^{\cos 2\theta}+\log\left(\frac{\cos 2\theta}{1+\sin 2\theta}\right)\right\}d\theta$$

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62. Evaluate: $\int\frac{x^2\left(x\sec^2 x+\tan x\right)}{\left(x\tan x+1\right)^2}dx$

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63. Evaluate: $\int e^{x\sin x+\cos x}\left\{\frac{x^4\cos^3 x-x\sin x+\cos x}{x^2\cos^2 x}\right\}dx$

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64. Evaluate: $\int e^{(x\sin x+\cos x)}\cdot\left(\frac{x^4\cos^3 x-x\sin x+\cos x}{x^2\cos^2 x}\right)dx$

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65. Evaluate: $\int \frac{x^2+42}{(x\sin x+7\cos x)^2}dx$

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66. Evaluate: $\int \frac{(x-\sin x)^{\frac{3}{2}}}{\sqrt{x}}\left\{\frac{6x^2\sin^2\left(\frac{x}{2}\right)}{x-\sin x}+3x\right\}dx$

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67. Evaluate: $\int \tan^{-1}\sqrt{\sqrt{x}-1}dx$

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68. Evaluate: $\int \frac{x^2+6}{(x\sin x+3\cos x)^2}dx$

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69. Evaluate: $\int \frac{\log_e(1+\sin^2 x)}{\cos^2 x} dx$

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70. Evaluate: $\int \frac{dx}{x(x^4+1)}$

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

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72. Evaluate: $\int \frac{\tan^{-1} x}{x^4} dx$

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

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74. Evaluate: $\int \frac{f(x)}{x^3-1}dx$, where $f(x)$ is a polynomial of degree 2 in x such that $f(0)=f(1)=3f(2)=-3$

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75. Evaluate $\int \sqrt[3]{\tan x}dx$

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76. Evaluate: $\int \frac{dx}{(2x+3)\sqrt{4x+5}}$

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

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

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79. Evaluate: $\int \frac{x-1}{(x+1)\sqrt{x^3+x^2+x}}\,dx$

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

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81. Evaluate: $\int \frac{dx}{(x-b)^3(x-a)^2}$

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82. Evaluate $\int \frac{dx}{\left(x+\sqrt{1+x^2}\right)^n}, n \neq \pm 1$

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

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

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85. Obtain the reduction formula for $\int \cos^n x dx$

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86. $\int e^{ax} \sin bx dx$ is:

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87. Find the value of $\int \frac{(x^m - 1)dx}{x^{m+1}\sqrt{1 - 2x^m + mx^{2m}}}$ (A) $\sqrt{m + \frac{2}{x^m} + \frac{1}{x^{2m}} + c}$ (B) $\sqrt{m - \frac{2}{x^m} + \frac{1}{x^{2m}} + c}$ (C) $\sqrt{m - \frac{2}{x^m} - \frac{1}{x^{2m}} + c}$ (D) $\sqrt{m + \frac{2}{x^m} - \frac{1}{x^{2m}} + c}$

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88. If $\frac{d}{dx}(f(x)) = f'(x)$, then $\int \frac{x.\ f'(x) - 2f(x)}{\sqrt{x^4.\ f(x)}} dx$ (A) $x^2 f(x) + c$ (B) $|x| f(x) + c$ (C) $2\frac{f(x)}{|x|} + c$ (D) $2\frac{\sqrt{f(x)}}{|x|} + c$

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89. $\int x \log x(\log x - 1)dx =$ (A) $\frac{x^2}{2}(\log x - 1)^2 dx =$ (B) $(x \log x)^2 + c$ (C) $\frac{1}{2}(x \log x + 1)^2 + c$ (D) $2(x \log x - x)^2 + c$

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90. If $I = \int \frac{e^x}{e^{4x} + e^{2e} + 1} dx$. $J = \int \frac{e^{-x}}{e^{-4x} + e^{-2x} + 1} dx$. Then for an arbitrary constant c, the value of $J - I$ equal to

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91. Let $f(x) = \frac{x}{(1 + x^n)^{\frac{1}{n}}}$ for $n \geq 2$ and $g(x) = \underbrace{fofo...of}_{\text{f occurs n times}}(x)$. Then $\int x^{n-2} g(x) dx$ equals (A) $\frac{1}{n(n-1)}(1 + nx^n)^{1 - \frac{1}{n}} + K$ (B) $\frac{1}{n-1}(1 + nx^n)^{1 - \frac{1}{n}} + K$ (C) $\frac{1}{n(n+1)}(1 + nx^n)^{1 + \frac{1}{n}} + K$ (D) $\frac{1}{n+1}(1 + nx^n)^{1 - \frac{1}{n}} + K$

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92. The integral $\int e^x(f(x)+f'(x))dx$ can be solved by using integration by parts such that: $I=\int e^x f(x)dx+\int e^x f'(x)dx=e^x f(x)-\int e^x f'(x)dx+\int e^x f'(x)dx=$, and $\int e^{ax}\left(f(x)+\frac{f'(x)}{a}\right)dx=e^{ax}\frac{f(x)}{a}+C$,Now answer the question: $\int e^x x^x(2+\log x)=$ (A) $e^x x^x\log x+C$ (B) e^x+x^x+C (C) $e^x x(\log x)^2+C$ (D) $e^x.\,x^x+C$

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93. The integral $\int e^x(f(x)+f'(x))dx$ can be solved by using integration by parts such that: $I=\int e^x f(x)dx+\int e^x f'(x)dx=e^x f(x)-\int e^x f'(x)dx+\int e^x f'(x)dx=$, and $\int e^{ax}\left(f(x)+\frac{f'(x)}{a}\right)dx=e^{ax}\frac{f(x)}{a}+C$,Now answer the question: $\int\left\{\log_e(\log_e x)+\frac{1}{(\log_e x)^2}\right\}dx$ is equal to (A) $\log_e(\log_e x)+C$ (B) $x\log_e(\log_e x)-\frac{x}{\log_e x}+C$ (C) $\frac{x}{\log_e x}-\log_e x+C$ (D) $\log_e(\log_e x)-\frac{x}{\log_e x}+C$

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94. The integral $\int e^x(f(x)+f'(x))dx$ can be solved by using integration by parts such that: $I=\int e^x f(x)dx+\int e^x f'(x)dx=e^x f(x)-\int e^x f'(x)dx+\int e^x f'(x)dx=$, and $\int e^{ax}\left(f(x)+\frac{f'(x)}{a}\right)dx=e^{ax}\frac{f(x)}{a}+C$,Now answer the question: $\int\frac{e^x(2-x^2)}{(1-x)\sqrt{1-x^2}}dx$ (A) $e^x\sqrt{\frac{1-x}{1+x}}+C$ (B) $e^x\sqrt{\frac{1+x}{1-x}}+C$ (C) $e^x\sqrt{\frac{2-x}{2+x}}+C$ (D) none of these

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Exercise

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

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2. $\int\cos^6 x\sin^3 x dx$

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3. $\int \sec^{\frac{3}{4}} x \cos ec^{\frac{5}{4}} x dx$

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

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

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

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7. $\int \tan^5 x dx$

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8. $\int \sin^4 x dx$

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9. $\int \sin^8 x dx$

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

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11. $\int \sqrt{\frac{\cos^3 x}{\sin^{11} x}} dx$

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12. $\int \sqrt{\tan x} \sec x \cos ecx dx$

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

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

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15. $\int \sec^6 x dx$

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16. $\int \sec^4\left(\frac{x}{2}\right)\tan\left(\frac{x}{2}\right)dx$

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17. $\int \tan^5\theta \sec^4\theta d\theta$

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18. $\int \sec^n x \tan x dx, n \neq 0$

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19. $\int \cot^n x \cos ec^2 x dx, n \neq -1$

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

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21. $\int \tan^5 x dx$

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

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23. $\int \tan^m x \sec^4 x dx$

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24. $\int \frac{dx}{a \sin x + b \cos x}$

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

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26. $\int \frac{\sec x}{b + a \tan x} dx$

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27. $\int \tan 2x \tan 5x \tan 7x dx$

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28. $\int \frac{dx}{\sec x + \cos ecx}$

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

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

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31. $\int \frac{dx}{\sqrt{13 + 5\cos x - 12\sin x}}$

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32. $\int \tan x \tan 2x \tan 3x dx$

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33. $\int \tan(x - \theta) \tan 2x \tan(x + \theta) dx$

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

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35. $\int \frac{dx}{\cos x \cos(x+\alpha)}$

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36. $\int \frac{\sin 2x}{\sin(x-\alpha)\sin(x+\alpha)} dx$

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

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

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

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40. $\int \frac{\cos x}{\sin^2 x} \left(1 - 3\cos^3 x\right) dx$

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

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

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43. $\int \frac{5\cos^3 x + 7\sin^3 x}{3\sin^2 x \cos^2 x} dx$

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44. $\int \frac{a^x + a^{2x}}{a^{4x}} dx$

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45. $\int \sec^2 x \cos^2 2x dx$

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46. $\int \frac{\cos 7x - \cos 8x}{\cos 2x - \cos 3x} dx$

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47. $\int \frac{2x^4 + 5}{x^2 + 1} dx$

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48. $\int \frac{x^6 + 1}{x^2 + 1} dx$

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

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

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

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

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

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54. $\int \frac{dx}{1+\sec x}$

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55. Integrate the following:

$$\int\left\{\frac{5\cos^3 x+2\sin^3 x}{2\sin^2 x\cdot\cos^2 x}+\sqrt{1+\sin 2x}+\frac{1+2\sin x}{\cos^2 x}+\frac{1-\cos 2x}{1+\cos 2x}\right\}dx$$

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56. $\int\frac{dx}{\{(x-5)+(x-7)\}\sqrt{(x-5)(x-7)}}$

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57. $\int\frac{\sin^3 x+\sin^5 x}{\cos^2 x+\cos^4 x}dx$

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58. $\int\frac{5x-2}{\sqrt{3x+7}}dx$

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

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60. $\int \frac{x^2}{\sqrt{1-x}} dx$

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61. $\int \frac{1+\sqrt{x}}{1+\sqrt[3]{x}} dx$

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62. $\int \frac{dx}{\sqrt{x+1}-\sqrt[4]{x+1}}$

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

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

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

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66. Evaluate: (i) $\int \frac{\sin\sqrt{x}}{\sqrt{x}}\, dx$ (ii) $\int \frac{(x+1)e^x}{\sin^2(x\, e^x)}\, dx$

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67. $\int \frac{\cos\left(\sqrt{x}-3\right)}{\sqrt{x}} dx$

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68. $\int \frac{\cos(\log x)}{x} dx$

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69. $\int \frac{\cos \sqrt{ax+b}}{\sqrt{ax+b}} dx$

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70. $\int \frac{\sin^3(3+2\log x)}{x} dx$

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

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72. $\int \frac{1+x^2}{x^2} e^{x-\frac{1}{x}} dx$

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

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

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75. $\int \frac{\tan^2 x \sec^2 x}{1+\tan^6 x} dx$

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76. $\int \frac{dx}{x \log x [\log(\log x)]}$

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77. $\int \frac{e^{2x}}{4\sqrt{e^x + 1}} dx$

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

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79. $\int \frac{dx}{x\sqrt{x^{2n} - a^{2n}}}$

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

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81. $\int x^3 (1-x^2)^{\frac{5}{2}} dx$

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

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

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84. $\int \frac{x^{e-1} - e^{x-1}}{x^e - e^x} dx$

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85. $\int \frac{1+\cos\theta}{\theta+\sin\theta} d\theta$

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86. $\int \frac{\tan x}{\sec x+\cos x} dx$

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87. Evaluate: $\int \frac{e^{\tan \hat{}((-1)x)}}{1+x^2} dx$

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

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89. $\int \sec x \log(\sec x + \tan x) dx$

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90. $\int \frac{x^2 \tan^{-1} x^3}{1 + x^6} dx$

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91. Evaluate: $\int \frac{a}{b + ce^x} dx$

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

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

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

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95. Evaluate: $\int \frac{10x^9 + 10^x (\log)_e 10}{10^x + x^{10}} dx$

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96. $\int \frac{x^5}{\sqrt{1 + x^2}} dx$

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97. $\int \frac{dx}{\sqrt[3]{(x+1)^2 (x-1)^4}}$

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98. $\int \frac{dx}{\sqrt{1+x^2}\sqrt{\log\left(x+\sqrt{1+x^2}\right)}}$

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99. $\int \frac{x^3}{\sqrt{1+x^8}} dx$

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

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101. $\int \frac{x^2}{(a^2+x^2)^2}$

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

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103. $\int \frac{x}{\sqrt{a^4-x^4}}dx$

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104. $\int \frac{\sqrt{x}}{\sqrt{a^2-x^3}}dx$

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105. $\int x\sqrt{\frac{a^2-x^2}{a^2+x^2}}dx$

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106. $\int \frac{dx}{\sqrt{1-e^{2x}}}$

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

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108. $\int \frac{x^{34}}{1+x^{14}} dx$

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

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

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

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112. $\int \frac{x^2}{\sqrt{1-x^2}}dx$

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

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

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115. $\int (x+2)\sqrt{x^2-1} dx$

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

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

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

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

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120. $\int \frac{dx}{x\left[(\log x)^2 + 4\log x - 1\right]}$

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

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

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

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124. $\int \sqrt{\frac{x-a}{b-x}} dx$

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125. $\int \frac{dx}{x\sqrt{1+x^n}}$

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126. $\int \sqrt{\frac{1+x^2}{x^2-x^4}}dx$

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

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

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129. $\int \frac{x-1}{x+1} \cdot \frac{1}{\sqrt{x^3+x^2+x}}dx$

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130. Evaluate: $\int \frac{x^2 - 1}{(x^4 + 3x^2 + 1)\tan^{-1}\left(x + \frac{1}{x}\right)} dx$

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

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132. $\int \frac{2\tan x + 3}{\sin^2 x + 2\cos^2 x} dx$

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133. $\int \frac{dx}{\sin x + \sec x}$

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

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

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

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137. $\int \sqrt{7x - 10 - x^2} dx$

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

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

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

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

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

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

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

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145. $\int \frac{dx}{3+4\sin x}$

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146. $\int \frac{dx}{3\sin x - 4\cos x + 5}$

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147. $\int \frac{dx}{4\tan x + 4\cot x}$

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148. $\int \frac{dx}{4\sin^2 x + 9\cos^2 x}$

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

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

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151. $\int \frac{dx}{(2 + \sin x)(1 - \sin x)}$

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152. $\int \frac{dx}{(2+\cos x)(3-\cos x)}$

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153. $\int e^x \left[\frac{x^3+x+1}{(1+x^2)^{\frac{3}{2}}} \right] dx$

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154. $\int e^x (\tan x - \log \cos x) dx$

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

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

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157. $\int e^x \frac{2-\sin 2x}{1-\cos 2x} dx$

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158. $\int \frac{e^{-\frac{x}{2}} \sqrt{1-\sin x}}{1+\cos x} dx$

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159. $\int \frac{e^x (1-\sin x)}{1-\cos x} dx$

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

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

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162. $\int e^{\tan^{-1} x} \left(1 + \frac{x}{1+x^2}\right) dx$

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163. $\int \frac{e^{\cot x}}{\sin^2 x} [2 \ln \cos ecx + \sin 2x] dx$

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164. $\int x\left(\frac{\sec 2x - 1}{\sec 2x + 1}\right)dx$

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165. $\int e^{4x}\sin 3x dx$

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166. $\int e^{\log_e x}\cos x dx$

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167. $\int \sin^{-1}\sqrt{\frac{x}{a+x}}dx$

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168. $\int \cos 2x \log \sin x dx$

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169. $\int \frac{\sin(\log x)}{x^3} dx$

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170. $\int \cos\left(b \log\left(\frac{x}{a}\right)\right) dx$

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171. $\int e^{m \sin^{-1} x} dx$

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172. $\int \frac{e^{m \tan^{-1} x}}{(1+x^2)^2} dx$

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173. $\int \cos^{-1}\left(\frac{1}{x}\right) dx$

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

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

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176. $\int \log(1-x^2) dx$

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177. $\int \log\left(x + \sqrt{a^2 + x^2}\right) dx$

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

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

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180. $\int \left(e^{\log x} + \sin x\right) \cos x dx$

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181. $\int \frac{\log(x^2 + a^2)}{x^2} dx$

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182. $\int x^3 e^{x^2} dx$

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183. $\int \frac{x \sin^{-1} x}{\sqrt{1 - x^2}} dx$

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

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185. $\int \cos 2\theta \log(1 + \tan \theta) dx$

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186. $\int \frac{xe^{m\sin^{-1}x}}{\sqrt{1-x^2}}dx$

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

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

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189. $\int [\sin(\log x)+\cos(\log x)]dx$

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190. $\int x^3 \sin(a \log x) dx$

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191. $\int (\sin^{-1} x)^2 dx$

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

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193. $\int e^{-x} \tan^{-1}(e^x) dx$

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

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195. $\int \frac{\log\left(\sec^{-1} x\right)}{x\sqrt{x^2-1}} dx$

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196. $\int \left(\frac{\cos x}{x} - \sin x \log x\right) dx$

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197. $\int \frac{\log \cos x}{\cos^2 x} dx$

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

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199. $\int \frac{\log\left(x + \sqrt{1 + x^2}\right)}{\sqrt{1 + x^2}} dx$

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

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201. $\int \frac{x^2 \cos x}{(1 + \sin x)^2} dx$

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202. $\int\left(\sec^2 x \cos^{-1} x - \frac{\tan x}{\sqrt{1-x^2}}\right)dx$

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203. $\int x \log\left(1+\frac{1}{x}\right)dx$

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204. $\int \sin x \log \tan x dx$

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205. $\int e^{-x} \log(e^x+1)dx$

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206. $\int \frac{1-\cos x}{\cos x(1+\cos x)} dx$

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207. $\int \frac{1+\sin x}{\sin x(1+\cos x)} dx$

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

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209. $\int \frac{dx}{\sin x(3+2\cos x)}$

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

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

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

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

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

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

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216. Evaluate: $\int \frac{x^3-1}{x^3+x}\,dx$

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

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

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219. $\int \frac{\cos x}{(1+\sin x)^2(2+\sin x)} dx$

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

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

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

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

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

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

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

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

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228. $\int \frac{dx}{x^2\sqrt{x^2-1}}$

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

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

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231. If $I_n = \int \frac{dx}{(x^2+a^2)^n}, n \in N,$ then show that: $I_{n+1} = \frac{1}{2na^2} \frac{x}{(x^2+a^2)^n} + \frac{2n-1}{2n} \cdot \frac{1}{a^2} I_n$

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232. If $I_n = \int \sqrt{(a^2+x^2)^n} dx,$ Prove that: $I_n = \frac{x\sqrt{(a^2+x^2)^n}}{n+1} + \frac{na^2}{n+1} \int (a^2+x^2)^{\frac{n}{2}-1} dx$

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233. The formula in which a certain integral involving some parameters in connected with some integrals of lower order is called a reduction formula. In most of the cases the reduction formula is obtained by the process of integrating by parts. Of course, in some cases the methods of differentiation are adopted. Now answer the question: If $I_{m-2,n+2} = \int \sin^{m-2} x \cos^{n+2} x dx$ and

$I_{m,n} = -\frac{\sin^{m-1} x \cos^{n+1} x}{n+1} + f(m,n) I_{\substack{m-2 \\ n+2}}$, then $f(2,3)$ is equal to

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) $\frac{1}{5}$

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234. The value of $\int \frac{(1+\log x)}{\sqrt{(x^x)^2 - 1}} dx$ is (A) $\sec^{-1}(x^x) + c$ (B) $\tan^{-1}(x^x) + c$ (C) $\log\left(x + \sqrt{(x^x)^2 - 1}\right) + c$ (D) none of these

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235. The value of the integral $\int \frac{x}{1 + x \tan x} dx$ is equal to (A) $\log|x \cos x + \sin x| + c$ (B) $\log|\cos x + x|$ (C) $\log|\cos x + x \sin x| + c$ (D) none of these

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236. The value of the integral $\int \frac{e^{5\log x} - e^{4\log x}}{e^{3\log x} - e^{2\log x}} dx$ is equal to (A) $x^2 + c$ (B) $\frac{x^3}{3} + c$ (C) $\frac{x^2}{2} + c$ (D) none of these

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237. If $\int \frac{\cos 5x + \cos 4x}{1 - 2\cos 3x}$ dx = $A(-\sin 2x) + B\sin x + c$ then $A + B$=

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238. The value of $\int \frac{f(x)\phi'(x) + \phi(x)f'(x)}{(f(x)\cdot\phi(x) + 1)\sqrt{\phi(x)\cdot f(x) - 1}} dx$ is (A) $\cos^{-1}\sqrt{f(x)^2 - \phi(x)^2}$ (B) $\tan^{-1}[f(x)\phi(x)]$ (C) $\sin^{-1}\sqrt{\frac{f(x)}{\phi(x)}}$ (D) none of these

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239. $\int \tan x \cdot \tan 2x \cdot \tan 3x dx$ is equal to (A) $\log\sin 3x + \log\sin 2x + \log\sin x + c$ (B) $\log(\sec 3x \sec 2x \sec x) + c$ (C)

$\frac{1}{3}\log|\sec 3x| - \frac{1}{2}\log|\sec 2x| - \log|\sec x| + c$ (D) none of these

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240. The value of $\int \sqrt{1+\sec x}dx$ is equal to (A) $2\sin^{-1}\left(\sqrt{2}\sin\left(\frac{x}{2}\right)\right)+c$ (B) $2\cos^{-1}\left(\sqrt{2}\sin\left(\frac{x}{2}\right)\right)+c$ (C) $2\sin^{-1}\left(\sqrt{2}\cos\left(\frac{x}{2}\right)\right)+c$ (D) none of these

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241. The value of $\int e^x \frac{(x^3+x+1)}{(1+x^2)^{\frac{3}{2}}}dx$ is equal to (A) $xe^x(1+x^2)^{\frac{5}{2}}+c$ (B) $xe^x(1+x^2)^{\frac{3}{2}}+c$ (C) $xe^x(1+x^2)^{-\left(\frac{1}{2}\right)}+c$ (D) none of these

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242. The value of $\int \frac{\sin^{-1}\sqrt{x}-\cos^{-1}\sqrt{x}}{\sin^{-1}\sqrt{x}+\cos^{-1}\sqrt{x}}dx$ is equal to

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243. If $\int \frac{x^2-2}{(x^4+5x^2+4)\tan^{-1}\left(\frac{x^2+2}{x}\right)}dx = \log|f(z)|+c,$ then (A) $f(z)=\tan^{-1}z,$ where $z=\sqrt{x+2}$ (B) $f(z)=\tan^{-1}z,$ where $z=x+\frac{2}{x}$ (C) $f(z)=\sin^{-1}z,$ where $z=\frac{x+2}{x}$ (D) none of these

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244. $If \int x\log\left(1+\frac{1}{x}\right)dx = f(x)\log(x+1)+g(x)x^2+Ax+C,$ then $f(x)=\frac{1}{2}x^2$ (b) $g(x)=\log x$ $A=1$ (d) none of these

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245. $\int \frac{1}{\cos^6 x+\sin^6 x}dx$ is equal to (A) $\tan^{-1}(\tan x-\cot x)+c$ (B) $\sin^{-1}(\sin 2x)+c$ (C) $\tan^{-1}(\tan x+\cot x)+c$ (D) $\cot^{-1}(\tan x+\cot x)+c$

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246. $\int \frac{\sin 5x}{\cos 7x \cos 2x} dx$ is equal to (A) $\log|\sec 7x| + c$ (B) $\log|\sec 7x \sec 2x| + c$ (C) $\log|\sec 7x + \sec 2x| + c$ (D) none of these

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247. $\int \frac{x \cos x \log x - \sin x}{x(\log x)^2} dx$ is equal to (A) $\sin x + c$ (B) $\log x \sin x + c$ (C) $\log x + \sin x + c$ (D) none of these

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248. $\int \frac{f(x) \cdot g'(x) - f'(x) g(x)}{f(x) \cdot g(x)} \cdot \{\log g(x) - \log f(x)\} dx =$ (A) $\log\left(\frac{g(x)}{f(x)}\right) + c$ (B) $\log\left(\frac{f(x)}{g(x)}\right) + c$ (C) $\frac{1}{2}\log\left(\frac{g(x)}{f(x)}\right)^2 + c$ (D) none of these

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249. $\int \frac{dx}{\sqrt{x}(1+x^2)^{\frac{5}{4}}} =$ (A) $\frac{2x}{(1+x^2)^{\frac{1}{4}}} + c$ (B) $\frac{2\sqrt{x}}{(1+x^2)^{\frac{1}{4}}} + c$ (C) $\frac{2\sqrt{x}}{1+x^2} + c$ (D) none of these

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250. $\int \frac{dx}{(x-1)^{\frac{3}{4}}(x+2)^{\frac{5}{4}}} =$ (A) $\frac{4}{3}\left(\frac{x-1}{x+2}\right)^{\frac{1}{4}} + c$ (B) $\frac{4}{3}\sqrt{\frac{x-1}{x+2}} + c$ (C) $\frac{4}{3}\left(\frac{x+2}{x-1}\right)^{\frac{1}{4}} + c$ (D) none of these

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251. $\int \frac{x^2}{(x\sin x + \cos x)^2} dx = -\frac{x\sec x}{x\sin x + \cos x} + f(x) + c$, then $f(x)$ may be (A) $\sin x$ (B) $x\sin x$ (C) $\tan x$ (D) $\cot x$

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252. $\int \frac{e^x(1+x)}{\cos^2(xe^x)}\,dx =$ $2(\log)_e \cos(xe^x)+C$ (b) $\sec(xe^x)+C$ (c) $\tan(xe^x)+C$ (d) $\tan(x+e^x)+C$

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253. $\int \frac{\log x}{(1+\log x)^2}dx =$ (A) $\frac{1}{1+\log x}+c$ (B) $\frac{x}{1+\log x}+c$ (C) $\log\log(1+\log x)+c$ (D) none of these

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254. $\int \frac{10x^9+10x^x(\log)_{e^{10}}dx}{x^{10}+10^x}$ equals(A) $10^x-x^{10}+C$ (B) $10^x+x^{10}+C$ (C) $\left(10^x-x^{10}\right)^{-1}+C$ (D) $\log\left(10^x+x^{10}\right)+C$

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255. $\int \frac{dx}{x(1+x^{10})} =$ (A) $\frac{1}{10}\log\left(\frac{1+x^{10}}{x^{10}}\right)+c$ (B) $\frac{1}{10}\log\left(\frac{x^{10}}{1+x^{10}}\right)+c$ (C) $\frac{1}{(1+x^{10})^2}+c$ (D) none of these

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256. If

$$\int \frac{(x+2)dx}{(x^2+3x+3)\sqrt{(x+1)}} = \frac{2}{\sqrt{3}}\left[\tan^{-1}\left(\frac{f(x)+1}{\sqrt{3}}\right)+\tan^{-1}\left(\frac{f(x)-1}{\sqrt{3}}\right.\right.$$

then f(x) is equal to

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257. $\int \frac{\cos x+\sin x}{\sqrt{\sin 2x}}dx =$ (A) $\sin^{-1}(\cos x+\sin x)$ (B) $\sin^{-1}(\sin x-\cos x)$ (C) $\cos^{-1}(\cos x+\sin x)$ (D) none of these

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258. $\int \frac{x+\sin x}{1+\cos x}dx =$ (A) $x\tan\left(\frac{x}{2}\right)+c$ (B) $\log(1-\cos x)+c$ (C) $\frac{\tan\left(\frac{x}{2}\right)}{2}+c$ (D) none of these

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259. If $\int \frac{\cos 4x+1}{\cot x-\tan x}dx = k\cos 4x + c$, then k= (A) $-\frac{1}{4}$ (B) $-\frac{1}{2}$ (C) $-\frac{1}{8}$ (D) none of these

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260. Evaluate: $\int e^x \frac{1+nx^{n-1}-x^{2n}}{(1-x^n)\sqrt{1-x^{2n}}}dx$

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261. $\int \frac{\cos^3 x+\cos^5 x}{\sin^2 x+\sin^4 x}dx =$ (A) $\sin x - 6\tan^{-1}(\sin x)+c$ (B) $\sin x - 2(\sin x)^{-1} - 6\tan^{-1}(\sin x)+c$ (C) $\sin^{-1} x - 2(\sin x)^{-1} + 5\tan^{-1}(\sin x)+c$ (D) none of these

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262. $\int \frac{x+1}{x(1+xe^x)^2} dx = \log|1-f(x)| + f(x) + c$, then $f(x) =$

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263. $If \int x \log\left(1+\frac{1}{x}\right) dx = f(x)\log(x+1) + g(x)x^2 + Ax + C,$ then $f(x) = \frac{1}{2}x^2$ (b) $g(x) = \log x$ $A = 1$ (d) none of these

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264. If $\int \frac{\sqrt{\cot x}}{\sin x \cos x} dx = a\sqrt{\cot x} + b$, then $a = 0$ (A) 1 (B) 2 (C) -1 (D) -2

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265. If $\int f(x) \cdot \cos x dx = \frac{1}{2}\{f(x)\}^2 + c$, then $f(0) =$ (A) 1 (B) 0 (C) -1 (D) none of these

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266. $\int \left[\frac{1}{\log x} - \frac{1}{(\log x)^2}\right] dx =$ (A) $\frac{x}{\log x}$ (B) $x \log x$ (C) $\frac{\log x}{x}$ (D) none of these

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267. $\frac{xe^x}{(1+x)^2} dx =$ (A) $\frac{e^x}{1+x}$ (B) $\frac{e^x}{(1+x)^2}$ (C) $e^x \log(1+x)$ (D) none of these

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268. If $\int \frac{\sin x}{\sin(x-\alpha)} dx = Ax + B \log \sin(x-\alpha) + C$, then value of (A, B) is (A) $(-\sin\alpha, \cos\alpha)$ (B) $(-\cos\alpha, \sin\alpha)$ (C) $(\sin\alpha, \cos\alpha)$ (D)

$(\cos\alpha, \sin\alpha)$

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

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

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

C. $\frac{1}{\sqrt{2}}\log\left|\tan\left(\frac{x}{2} - \frac{\pi}{6}\right)\right| + C$

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

Answer: D

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270. If $\int\left[\frac{\log x - 1}{1 + (\log x)^2}\right]^2 dx = \frac{f(x)}{1 + (g(x))^2} + c$, then (A) $f(x) = x$ (B) $f(x) = x^2$ (C) $g(x) = \log x$ (D) $g(x) = (\log x)^2$

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271. $\int \frac{1}{\cos x + \sqrt{3}\sin x} dx$ equals (i) $\log\left(\tan\left(\frac{x}{2} + \frac{\pi}{12}\right)\right) + c$ (ii) $\log\left(\tan\left(\frac{x}{2} - \frac{\pi}{12}\right)\right) + c$ (iii) $\frac{1}{2} \cdot \log\left(\tan\left(\frac{x}{2} + \frac{\pi}{12}\right)\right) + c$ (iv) $\frac{1}{2} \cdot \log\left(\tan\left(\frac{x}{2} - \frac{\pi}{12}\right)\right) + c$

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272. The value of $\sqrt{2}\int \frac{\sin x dx}{\sin\left(x - \frac{\pi}{4}\right)}$ is: (1) $x + \log\left|\cos\left(x - \frac{\pi}{4}\right)\right| + c$ (2) $x - \log\left|\sin\left(x - \frac{\pi}{4}\right)\right| + c$ (3) $x + \log\left|\sin\left(x - \frac{\pi}{4}\right)\right| + c$ (4) $x - \log\left|\cos\left(x - \frac{\pi}{4}\right)\right| + c$

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273. $If \int \frac{x^4 + 1}{x^6 + 1} dx = \tan^{-1} f(x) - \frac{2}{3}\tan^{-1} g(x) + C, then$ both $f(x) and g(x)$ are odd functions $f(x)$ is monotonic function $f(x) = g(x)$ has no real roots $\int \frac{f(x)}{g(x)} dx = -\frac{1}{x} + \frac{3}{x^3} + c$

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

A. $\frac{1}{1+xe^x}+C$

B. $\log\left(\frac{xe^x}{1+xe^x}\right)+C$

C. $\frac{1}{1+xe^x}+\log\left(\frac{xe^x}{1+xe^x}\right)+C$

D. $x(e^x+1)+C$

Answer: C

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275. $\int \frac{\log_e(x+1)-\log_e x}{x(x+1)}dx$ is equal to (A) $-\frac{1}{2}\left[\log(x+1)^2-\frac{1}{2}\log x\right]^2+\log_e(x+1)\log_e x+C$ (B) $-\left[(\log_e(x+1)-\log_e x\right]^2$ (C) $c-\frac{1}{2}\left(\log\left(1+\frac{1}{x}\right)\right)^2$ (D) none of these

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276. If $\int \frac{xe^x}{\sqrt{1+e^x}}dx = f(x)\sqrt{1+e^x} - 2\log g(x) + c$, then

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277. $\int \frac{4e^x + 6e^{-x}}{9e^x - 4e^{-x}}dx = Ax + B\log\left(9e^{2x} - 4\right) + C, then$ A=_____ _, B=_____, C=_____

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278. If $\int \left[\frac{\log x - 1}{1 + (\log x)^2}\right]^2 dx = \frac{f(x)}{1 + (g(x))^2} + c$, then (A) $f(x) = x$ (B) $f(x) = x^2$ (C) $g(x) = \log x$ (D) $g(x) = (\log x)^2$

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279. Statement-1: $\int \frac{dx}{x(1+\log x)^2} = -\frac{1}{1+\log x} + C$, Statement-2: $\int (f(x))^n f'(x)dx = \frac{(f(x))^{n+1}}{n+1} + C, n+1 \neq 0$ (A) Statement-1 is True,

Statement-2 is True, Statement-2 is a correct explanation for Statement-1. (B) Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1. (C) Statement-1 is True, Statement-2 is False. (D) Statement-1 is False, Statement-2 is True.

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280. Statement-1:

$$\int \frac{3-2x}{\sqrt{4+2x-x^2}}dx = 2\sqrt{4+2x-x^2} + \sin^{-1}\left(\frac{x-1}{\sqrt{5}}\right) + C$$

,Statement-2: $\int \frac{dx}{\sqrt{a^2-x^2}} = \frac{x}{2}\sqrt{(a^2-x^2)} + \frac{a^2}{2}\sin^{-1}\left(\frac{x}{a}\right)$ (A) Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1. (B) Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1. (C) Statement-1 is True, Statement-2 is False. (D) Statement-1 is False, Statement-2 is True.

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281. Statement-1: The function $F(x) = \int \sin^2 x dx$ satisfies $F(x+\pi) = F(x), \forall \xi n R$,Statement-2: $\sin^2(x+\pi) = \sin^2 x$ (A) Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1. (B) Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1. (C) Statement-1 is True, Statement-2 is False. (D) Statement-1 is False, Statement-2 is True.

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282. Consider the function $F(x) = \int \frac{x}{(x-1)(x^2+1)} dx$Statement-1: $F(x)$ is discontinuous at $x = 1$,Statement-2: Integrand of $F(x)$ is discontinuous at $x = 1$ (A) Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1. (B) Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1. (C) Statement-1 is True, Statement-2 is False. (D) Statement-1 is False, Statement-2 is True.

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283. Let a solution $y = y(x)$ of the differential equation $x\sqrt{x^2 - 1}dy - y\sqrt{y^2 - 1}dx = 0$ satisfy $y(2) = \frac{2}{\sqrt{3}}$Statement-1: $y(x) = \sec\left(\sec^{-1} x - \frac{\pi}{6}\right)$Statement-2: $y(x)$ is given by $\frac{1}{y} = \frac{2\sqrt{3}}{x} - \sqrt{1 - \frac{1}{x^2}}$ (A) Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1. (B) Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1. (C) Statement-1 is True, Statement-2 is False. (D) Statement-1 is False, Statement-2 is True.

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284. Statement-1: $\int\left(\frac{x^2 + 1}{x^2}\right)e^{\frac{x^2+1}{x^2}}dx = e^{\frac{x^2+1}{x^2}} + C$ Statement-2: $\int f(x)e^{f(x)}dx = f(x) + C$ (A) Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1. (B) Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1. (C) Statement-1 is True, Statement-2 is False. (D) Statement-1 is False, Statement-2 is True.

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285. Statement-1: $\int \sin^{-1} x dx + \int \sin^{-1} \sqrt{1-x^2} dx = \frac{\pi}{2} x + c$ Statement-2: $\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}$ (A) Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1. (B) Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1. (C) Statement-1 is True, Statement-2 is False. (D) Statement-1 is False, Statement-2 is True.

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286. Statement-1: $\int (\sin x)^x (x \cot x + \log \sin x) dx = x (\sin x)^x$ Statement-2: $\frac{d}{dx} (f(x))^{g(x)} = (f(x))^{g(x)} \frac{d}{dx} [g(x) \log f(x)]$ (A) Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1. (B) Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1. (C) Statement-1 is True, Statement-2 is False. (D) Statement-1 is False, Statement-2 is True.

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287. The formula in which a certain integral involving some parameters in connected with some integrals of lower order is called a reduction formula. In most of the cases the reduction formula is obtained by the process of integrating by parts. Of course, in some cases the methods of differentiation are adopted.Now answer the question:If $I_{m-2,n+2} = \int \sin^{m-2} x \cos^{n+2} x dx$ and $I_{m,n} = -\frac{\sin^{m-1} x \cos^{n+1} x}{n+1} + f(m,n) I_{\substack{m-2 \\ n+2}}$, then $f(2,3)$ is equal to

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) $\frac{1}{5}$

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288. Let n be a positive integer such that $I_n = \int x^n \sqrt{a^2 - x^2} dx$Now answer the following question:The value of I_1 is (A) $\frac{2}{3}(a^2 - x^2)^{\frac{1}{2}}$ (B) $\frac{1}{3}(a^2 - x^2)^{\frac{3}{2}}$ (C) $-\frac{2}{3}(a^2 - x^2)^{\frac{3}{2}}$ (D) $-\frac{1}{3}(a^2 - x^2)^{\frac{3}{2}}$

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289. Let n be a positive integer such that $I_n = \int x^n \sqrt{a^2 - x^2} dx$ Now answer the following question: The value of I_1 is (A) $\frac{2}{3}(a^2 - x^2)^{\frac{1}{2}}$ (B) $\frac{1}{3}(a^2 - x^2)^{\frac{3}{2}}$ (C) $-\frac{2}{3}(a^2 - x^2)^{\frac{3}{2}}$ (D) $-\frac{1}{3}(a^2 - x^2)^{\frac{3}{2}}$

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290. Integral of the form $\int [xf'(x) + f(x)] dx$ can be evaluated by using integration by parts in first integral and leaving second integral as it is.Now answer the question: $\int \frac{x + \sin x}{1 + \cos x} dx =$ (A) $x \frac{\tan x}{2} + c$ (B) $\frac{x}{2} \frac{\tan x}{2} + c$ (C) $\frac{x}{2} \tan x + c$ (D) none of these

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291. Integral of the form $\int [xf'(x) + f(x)] dx$ can be evaluated by using integration by parts in first integral and leaving second integral as it is.Now answer the question: $\int [x^{x+1}(\log x + 1) + x^x] dx =$ (A) $x^{x+2} + c$ (B) $x^{x+1} + c$ (C) $x^x + x + c$ (D) none of these

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292. Integral of the form $\int [xf'(x) + f(x)]dx$ can be evaluated by using integration by parts in first integral and leaving second integral as it is.Now answer the question: $\int \left[\frac{1}{x^4+1} - \frac{4x^4}{(x^4+1)^2}\right]dx =$ (A) $\frac{x^2}{x^4+1} + c$ (B) $\frac{x^3}{x^4+1} + c$ (C) $\frac{x}{x^4+1} + c$ (D) none of these

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293. Let $f: R\overrightarrow{R}$ be a continuous function and $f(x) = f(2x)$ is true $\forall x \in R$. If $f(1) = 3$, then the value of $\int_{-1}^{1} f(f(x))dx$ is equal to 6 (b) 0 (c) $3f(3)$ (d) $2f(0)$

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294. If $f(x) = \int \frac{3x^4 - 1}{(x^4 + x + 1)^2} dx$ and $f(0) = 0$, then $f(-1) = ...$

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295. If $n \in N$ and

$$\int \left(x^{7n} + x^{2n} + x^{n}\right)\left(2x^{6n} + 7x^{n} + 14\right)^{\frac{1}{n}} dx = \frac{\left(2x^{7n} + 7x^{2n} + 14x^{n}\right)^{\frac{n+1}{n}}}{k(n+1)} +$$

, then, k is equal to...

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296. If $\int \frac{4x^3 + a4^x}{4^x + x^4} dx = \log\left(x^4 + 4^x\right) + c$, then $e^a = ...$

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297. If $z = (x+1)^{\frac{1}{6}}$ and

$$\int \frac{x}{(1+x)^{\frac{1}{3}} - \sqrt{1+x}} dx, a\left(\frac{z^4}{4} + \frac{z^5}{5} + \frac{z^6}{6} + \frac{z^7}{7} + \frac{z^8}{8} + \frac{z^9}{9}\right) + c,$$

then $|a| = ...$

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