MATHS

BOOKS - SHARAM PUBLICATION

INTEGRAL CALCULUS

Example

1. Write the definite integral which is equal to $\lim_{n \to \infty} \frac{1}{n} \sum_{r=1}^{n} \frac{r}{\sqrt{n^2 + r^2}}$

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2. Evaluate $\int_0^1 [3x]dx$

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3. What is the value of $\int_0^{\frac{\pi}{2}} \log \tan x dx$?

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4. What is the value of $\int_0^{\pi} \left(\frac{f(x)}{f(x) + f\left(\frac{\pi}{2} - x\right)} \right) dx$?

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5. Evaluate $\int \frac{e^{\tan^{-1} x}}{1+x^2} dx$

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6. Write the value of $\int \frac{\sec^2 x}{\cos ec^2 x} dx.$

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7. Write the value of $\int_0^{\frac{\pi}{2}} \frac{\sin x}{\sin x + \cos x} dx - \int_0^{\frac{\pi}{2}} \frac{\cos x}{\sin x + \cos x} dx$

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8. If $\int_2^3 f(z)dx = 9$, then write the value of $\int_2^3 f(\phi(z))d(\phi(z))$.

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9. What do you mean by integration ? Write your answer in one sentence.

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10. Write the value of $\int_{-\pi/4}^{\pi/4} \sin^5 x \cos x dx$

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11. If $g(x) = \int_0^x \cos^4 t dt$then what is the value of $g(x+\pi)$?

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12. $\int_0^{\frac{\pi}{2}} In(\tan x + \cot x)dx$

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13. Find the value of $\int_0^{\pi} \frac{d\theta}{1-2\sin^2\theta}$

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14. What is the value of $\int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} \sqrt{4-4\sin^2 t}dt$

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15. What is the value of $\int_{1}^{\sqrt[7]{2}} \frac{1}{x(2x^7+1)}dx$

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16. Evaluate $\int_{0}^{1} e^x dx$

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17. If

$$f(x) = \left| \begin{bmatrix} \sin x + \sin 2x + \sin 3x & \sin 2x & \sin 3x \\ 3 + 4\sin x & 3 & 4\sin x \\ 1 + \sin x & \sin x & 1 \end{bmatrix} \right|$$

then what is the value of $\int_0^{\frac{\pi}{2}} f(x)dx$?

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18. Evaluate $\int \frac{\sin 6x + \sin 4x}{\cos 6x + \cos 4x} dx$

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19. Evaluate the following integrals :

$$\int \frac{dx}{x\left[(\log x)^2 + 25\right]}$$

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20. $\int \sin^{-1} x dx$

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21. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$

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22. integrate $\int \frac{3 + \cos x + \tan^2 x}{2x + \sin x + \tan x}$

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23. Integrate $\int\left(\frac{\sin x-\cos x}{\sqrt{1-\sin 2x}}e^{\sin x}.\cos x dx\right.$

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24. Evaluate $\int\frac{\sqrt{\tan x}}{\sin x\cos x}.$

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25. If f is an odd function, then write the value of $\int_{-a}^{a}\frac{f(\sin x)}{f(\cos x)+f\left(\sin^2 x\right)}dx$

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26. Evaluate the following integrals :

$$\int \frac{\cot x}{\ln \sin x} dx.$$

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

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28. Write the value of $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \cos^4 x . \sin^{99} x dx$

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29. What is the value of $\int \frac{d}{dx} f(x)dx - \frac{d}{dx}\int f(x)dx$?

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30. If $\int_1^2 f(x)dx = \lambda$ then what is the value of $\int_1^2 f(3-x)dx$

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31. What is the value of $\int_{-1}^{1} \frac{dx}{1+x^2}dx$

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32. If f is an even function and $\int_{-2}^{0} f(t)dt = \frac{3}{2}$, then find $\int_{-2}^{2} f(x)dx$.

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33. Write the primitive of $\sin x + \sec x$

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34. $\int e^{x}(\tan x + In \sec x)dx$

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35. $\int \frac{\cot^2 x - \operatorname{cosec}^2 x}{x^2} dx$

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36. $\int 2 \sin(\alpha - \beta) x \sin(\alpha + \beta) x dx$

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

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38. What is the value of $\int \frac{1+\frac{1}{x^2}}{x-\frac{1}{x}+4} dx$

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

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40. What is the value of $\int e^x \cos x dx + \int e^x \sin x dx$?

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41. What is the value of m for which $\int x^m dx \neq \frac{x^{m+1}}{m+1}$

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42. Write the value of $u\int vdx - \int u'\left\{\left(\int vdx\right)\right\}dx - v\int udx\int v'\left\{\left(\int udx\right)\right\}dx$

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43. What is $F^1(x)$ if F(x)= $\int_0^x e^{2t}\sin 3tdt$

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44. Evaluate $\int e^{\ln\left(\operatorname{cosec}^2 x - \cot^2 x\right)} dx.$

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45. $\int e^x \left[f(x) + f^1(x)\right] dx$

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

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47. write down the integral of $\int e^{x^2} 2x dx.$

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48. Write the value of $\int_{-\pi/4}^{\pi/4} \sin^5 x \cos x dx$

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49. Write the value of $\int_{\frac{\pi}{3}}^{\frac{\pi}{3}} \left(x^4 \sin x^3 + x \cos^2 x\right) dx$

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50. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^5 x . \cos\left(\frac{1}{2} nx\right) dx = ?$

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51. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^5 x dx = ?$

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52. If $\int_{-\frac{1}{2}}^{\frac{1}{2}} \cos x In \frac{1+x}{1-x} dx = kIn^2$ then write the value of k.

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53. If $f(x) = \int_0^x e^{2t}. \sin 3t dt$then what is $f^1(x)$?

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54. If $\int_0^1 f(t)dt = 2\int_2^1 f(u)du = -1$,then what is $\int_0^2 f(x)dx$?

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55. What is the value of $\frac{dy}{dx}\int_{250}^{300}\left(x^4+5x^3\right)^2 dx$?

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56. Find $\int_{-1}^{1}|x|dx$

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57. Find $\int_{-2}^{-1} |x| dx$

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58. What is the value of $\int_1^3 \tan^{-1} x dx + \int_1^3 \cot^{-1} x dx$

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59. What is the integral of $\int \log e^x dx$?

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60. Evaluate $\int_0^2 |x-2|dx$

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61. What is the value of $\int_0^1 \sin^2 t dt + \int_0^1 \cos^2 t dt - \int_0^1 dr$?

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62. If $\int_0^1 f(1-x)dx = 2$,then what is the value of $\int_0^{1/2} f(2t)dt$

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63. What is the area bounded by $x = e^y, x = 0, y = 0$ and $y = 1$?

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64. What is the area bounded by $y = x, y = 0$, y=0 and $x = 1$?

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65. Write the area bounded by $y = -2x, y = 0, x = 1$ and $x = 3$.

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66. If $f(x) = \int \frac{dx}{(1+x^2)^{\frac{3}{2}}}$ and f(0)=0 then what is the value of f(1)?

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

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68. Integrate: $\int \frac{x^5}{(x^3+1)^4} dx$

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69. Integrate $\int\left(e^x-\frac{1}{\sqrt{1-x^2}}\right)dx$

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70. Show that

$$\int_0^1 \frac{Inx}{\sqrt{1-x^2}}dx=\frac{\pi}{2}In\frac{1}{2}$$

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

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72. Prove that $\int_0^{\frac{\pi}{2}} \frac{\sin^n x}{\sin^n x + \cos^n x} dx = \frac{\pi}{4}$

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73. Integrate $\int \sec x \tan x \sqrt{\tan^2 x - 3} dx$

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74. Evaluate $\int \frac{x \cos^{-1} x}{\sqrt{1 - x^2}} dx$

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

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

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77. Evaluate $\int \frac{x^2}{(x^2+4)(x^2+9)} dx$

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

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79. Evaluate $\int \frac{(3\sin x - 2)\cos x}{5 - \cos^2 x - 4\sin x} dx$

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80. If $f'(x) = e^x + \frac{1}{1+x^2}$ and $f(0) = 1$, then find f(x).

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81. Evaluate : $\int (\log x)^2 dx$

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82. Evaluate: $\int \frac{2x+9}{(x+3)^2} dx$

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83. $\int_0^1 \frac{x^5(4-x^2)}{\sqrt{1-x^2}} dx$

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84. Evaluate $\int \frac{\sin x \cos x}{\sin^2 x - 2\sin x + 3} dx$

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85. $\int_0^1 x^5 \sqrt{\frac{1+x^2}{1-x^2}} dx$

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86. $\int x^2 \tan^{-1} x dx$

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87. Evaluate $\int \frac{dx}{x \ln(x) \sqrt{(In(x))^2 - 4}}$

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88. Evaluate the following integrals :

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

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89. $\int \frac{xe^x}{1+x^2} dx$

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90. Integrate: $\int \frac{a}{b+ce^x} dx$

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91. Integrate $\int \frac{e^{x-1}+x^{e-1}}{e^x+x^e}dx$

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

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

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94. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\cos x}}{\sqrt{\sin x}+\sqrt{\cos x}} dx$

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95. Integrate $\int \tan^{-1} x dx.$

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96. Integrate $\int \frac{\sin ax + \sin bx}{\cos ax + \cos bx} dx$

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97. Evaluate $\int_0^{\frac{\pi^2}{4}} \sin\sqrt{x}dx$

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

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99. Integrate the following $\int \frac{\sec^2\sqrt{x}}{\sqrt{x}}dx$

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100. $\int_0^{\frac{3}{2}} [2x]dx$

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101. $\int_0^2 [x^2]dx$

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

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103. Evaluate $\int_0^4 \sqrt{x}dx$

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

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105. Evaluate the following integrals

$\int \frac{3\sin x + 28\cos x}{5\sin x + 6\cos x} dx$

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106. Evaluate the following integrals :

$$\int_0^{\pi/2} \log\left|\frac{4+3\sin x}{4+3\cos x}\right| dx.$$

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107. Evaluate the following integrals :

$$\int \frac{\sec x \quad \text{cosec x}}{\ln \tan x} dx.$$

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108. Evaluate the following integrals :

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

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

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110. Integrate: $\int x^2 e^{x^3} \sin e^{x^3} dx$

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111. Evaluate $\int \frac{4x-5}{x^2-x-2} dx$

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112. Evaluate $\int \frac{e^x \sin e^x}{\sqrt{16 + \cos^2 e^x}} dx$

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

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

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115. $\int e^x (\cot x + In \sin x) dx$

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116. What is the value of $\int \frac{d}{dx} f(x)dx - \frac{d}{dx}\int f(x)dx$?

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117. What is the value of $\int \frac{1+\frac{1}{x^2}}{x-\frac{1}{x}+4}dx$

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

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119. Evaluate : $\int_0^{\frac{\pi}{4}} \frac{dx}{\cos x(\cos x + \sin x)}$

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120. Evaluate $\int_0^1 [3x]dx$

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121. Evaluate: $\int_0^4 |8 - 3x|dx$

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122. Evaluate : $\int_0^{1.415} \left[x^2\right] dx$

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123. Evaluate $\int_0^1 \tan^{-1} x dx$

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124. Evaluate $\int_0^{2\pi} \cos x dx$

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125. Evaluate $\int_0^3 x^2 . e^{x^3} dx$

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126. Evaluate : $\int (x^2) dx$

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127. Evaluate : $\int_0^{0.4} ([x] + |x|) dx$

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128. Write the value of $\int_{\frac{\pi}{3}}^{\frac{\pi}{3}} \left(x^4 \sin x^3 + x \cos^2 x\right) dx$

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129. Evaluate: $\int \left(\frac{2 \cos x + 7}{4 - \sin x} \right) dx$

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

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131. Find: $\int \frac{\sin^{-1}\sqrt{x} - \cos^{-1}\sqrt{x}}{\sin^{-1}\sqrt{x} + \cos^{-1}\sqrt{x}} dx$

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132. Integrate: $\int \frac{x^2}{x^4 + x^2 + 1} dx$

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133. Integrate: $\int \frac{\cos x}{1 + 2\sin x} dx$

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134. $\int_0^{\pi} \frac{x dx}{1 + \sin x}$

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135. Evaluate the following integrals

$$\int \frac{12\sin x - 2\cos x + 3}{\sin x + \cos x} dx$$

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

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137. $$\int \left(\sqrt{\tan x} + \sqrt{\cot x}\right) dx$$

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138. Integrate: $\int \frac{\sin x}{\sin 4x} dx$

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139. What is $\int \frac{\sin^8 x - \cos^8 x}{1 - 2\sin^2 x \cos^2 x} dx$?

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140. Evaluate : $\int_{-\pi}^{\pi} \frac{2x(1 + \sin x)}{1 + \cos^2 x} dx$

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141. Integrat: $\int \frac{1}{\sin x + \sin 2x} dx$

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

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143. $\int_{\pi/6}^{\pi/3} \frac{dx}{1 + \sqrt{\cot x}}$

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144. $\int_0^{\pi} \frac{x \sin x dx}{1+\cos^2 x}$

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145. Show that $\int_0^1 \frac{\log(1+x)}{1+x^2} dx = \frac{\pi}{8} \log 2$

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146. Integrate: $\int \left(\sin^4 x - \cos^4 x\right) dx$

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

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148. Evaluate the following integrals :

$$\int \frac{dx}{(x-2)\sqrt{x^2-16x+64}}$$

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149. Evaluate the following integrals :

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

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150. $\int 2x^3 \cos x^2 dx$

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151. Evaluate the following integrals :

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

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152. Find $\int x^2\left(\sin^4 x + \cos^4 x\right)dx$

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

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154. Evaluate the following integrals :

$$\int e^x \sec x(1+\tan x)dx.$$

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155. Evaluate the following integrals

$$\int \frac{4x^2-x+3}{(x^2+1)(x-1)}dx$$

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156. $\int \sqrt{1+2x-x^2}dx$

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

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158. Integrate: $\int \frac{dx}{2 - \sin x}$

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159. $\int (x^2 + 2x + 7)\sqrt{x + 1} dx$

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160. Integrate: $\int \frac{2\sin x - 3\cos x}{4\sin x + 3\cos x} dx$

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

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162. Integrate: $\int \frac{dx}{\sqrt{7 + 4x + x^2}}$

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163. Integrate: $\int \frac{dx}{5 + \sin x}$

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

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165. Integrate: $\int \frac{x^5}{(x^3+1)^4} dx$

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166. Integrate: $\int x^9 . \cos x^5 dx$

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

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168. $\int \frac{\sin x}{\sin(x+\alpha)} dx$

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169. Evaluate the following integrals :

$\int \frac{dx}{x\left[(\log x)^2 + 25\right]}$

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

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171. Evaluate the following integrals :

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

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

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173. Evaluate: $\int_0^{\frac{\pi}{4}} \cos^2 2x \sin^3 4x dx$

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174. Evaluate: $\int_0^{\frac{\pi}{2}} \frac{\sin x(7-\cos x)}{(1+\cos^2 x)(2-\cos x)}$dx

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175. Evaluate $\int_0^{\pi/2} \frac{dx}{1+2\cos x}$

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176. Evaluate $\int_0^1 \frac{\ln(1+x)}{1+x^2}\,dx$

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177. Evaluate: $\int_{\frac{\pi}{4}}^{\frac{\pi}{3}} \frac{dx}{\sin^2 x + 3\cos^2 x}$

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178. Evaluate $\int_0^{\pi/2} \frac{\cos x}{(2+\sin x)(3+\sin x)}\,dx$

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179. $\int_0^{\pi} \frac{x dx}{1+\sin x}$

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180. Evaluate $\int_0^1 \frac{\ln(1+x)}{1+x^2} dx$

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181. Integrate: $\int_2^7 \frac{dx}{\sqrt{x+2}+\sqrt{x-2}}$

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182. Integrate: $\int_0^1 x \log(1+x) dx$

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183. Evaluate $\int_1^2 \frac{dx}{16 - x^2}$

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184. Integrate: $\int_{-2}^{2} \{[x] + |x|\} dx$

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185. $\int_0^1 x \tan^{-1} x dx$

Watch Video Solution

186. Integrate: $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\tan x}}{\sqrt{\tan x} + \sqrt{\cot x}} dx$

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187. Prove that $\int_0^{\frac{\pi}{2}} \frac{dx}{a^2 \cos^2 x + b^2 \sin^2 x} = \frac{\pi}{2ab}, a, b > 0$

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188. Evaluate $\int \frac{x^5 + x^4 + x^3 + x^2 + 4x + 1}{x^3 + 1} dx$

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