



MATHS

BOOKS - MAXIMUM PUBLICATION

Integrals

Example

1. Integrate the following.

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



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2. Integrate the following.

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



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3. Find $\int \frac{2 + \sin 2x}{1 + \cos 2x} e^x dx$



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4. Evaluate $\int \frac{\sec^2 x dx}{\sqrt{\tan^2 x + 4}}$



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5. Find the following integrals.

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



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6. Find the following integrals.

$$\int_0^1 x e^{x^2} dx$$



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7. Find the following integrals.

$$\int_0^{\frac{\pi}{2}} \sqrt{\sin x} \cos^5 x dx$$



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8. Find the following integrals.

$$\int_0^2 x \sqrt{x+2} dx$$



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9. Find the following integrals.

$$\int_0^{\frac{\pi}{2}} \sqrt{\sin x} \cos x dx$$



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10. Find the following integrals.

$$\int_0^{\frac{\pi}{2}} \frac{1}{4 \sin^2 x + 5 \cos^2 x} dx$$



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11. If $f(x)$ is an odd function, then

$$\int_{-a}^a f(x) = ?$$

A. 0

B. 1

C. $2 \int_0^a f(x) dx$

D. $2a$

Answer:



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12. Evaluate

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^{99} x \cdot \cos^{100} x dx$$



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13. Evaluate

$$\int_{-1}^1 e^{|x|} dx$$



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14. Show that $\cos^2 x$ is an even function.



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15. Evaluate $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \cos^2 x dx$



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16. Find the following integrals.

$$\int \frac{1}{9x^2 + 6x + 5} dx$$



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17. Find the following integrals.

$$\int \frac{1}{\sqrt{7 - 6x - x^2}} dx$$



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18. Find the following integrals.

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



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19. Find the following integrals.

$$\int_0^{\frac{\pi}{2}} \frac{\sin^5 x}{\sin^5 x + \cos^5 x} dx$$



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20. Find the following integrals.

$$\int_0^2 x \sqrt{2-x} dx$$



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21. Find the following integrals.

$$\int_2^8 |x - 5| dx$$



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22. Find the following integrals.

$$\int_{-5}^5 |x + 2| dx$$



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23. Find the following integrals.

$$\int \frac{1}{3 + \cos x} dx$$



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24. Find the following integrals.

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



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25. Find the following integrals.

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



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26. Find the following integrals.

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



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27. Find the following integrals.

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



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28. Find the following integrals.

$$\int e^{2x} \sin 3x dx$$



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29. Find the following integrals.

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



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30. which of the following is the value of

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

A. $\frac{1}{a} \tan^{-1} \frac{x}{a} + c$

B. $\tan^{-1} \frac{x}{a} + c$

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

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

Answer:



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31. Evaluate $\int \frac{2x}{x^2 + 3x + 2} dx$



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32. Choose the correct answer from the bracket.

$$\int e^x dx = \text{---}$$

$$(e^{2x} + c, e^x + c, e^{-x} + c, e^{-2x} + c)$$



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33. Evaluate $\int e^x \sin x dx$



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34. $f(x) \int g(x) dx - \int (f'(x) \int g(x) dx) dx$

A. $\int f'(x) g(x) dx$

B. $\int f(x)g'(x)dx$

C. $\int \frac{f(x)}{g(x)}dx$

D. $\int f(x)g(x)dx$

Answer:



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35. Integrate $\sin^{-1} \sqrt{\frac{x}{a+x}}$ w.r.to x.



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36. Match the following.

A	B
$\int \frac{1}{x^2 - 9} dx$	$\frac{e^{3x}}{3} + c$
$\int \sec x(\sec x + \tan x) dx$	$e^{3x} + c$
$\int e^{3x} dx$	$\sec x \cdot \tan x + c$
$\int (\sin x + \cos x) dx$	$\sec x + \tan x + c$
	$\frac{1}{6} \log \left \frac{x-3}{x+3} \right + c$
	$\sin x - \cos x + c$



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37. Evaluate $\int \frac{x}{\sqrt{x+a} + \sqrt{x+b}} dx$



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38. Match the following.

A	B
$\int \frac{1}{x^2 - 9} dx$	$\frac{e^{3x}}{3} + c$
$\int \sec x (\sec x + \tan x) dx$	$e^{3x} + c$
$\int e^{3x} dx$	$\sec x \cdot \tan x + c$
$\int (\sin x + \cos x) dx$	$\sec x + \tan x + c$
	$\frac{1}{6} \log \left \frac{x-3}{x+3} \right + c$
	$\sin x - \cos x + c$



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39. Consider the integral $I = \int \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$

what substitution can be given for simplifying the above integral



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40. Evaluate the integral $I = \int \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$



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41. Consider the integral $I = \int \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$

Evaluate I.



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42. Evaluate $\int_0^{\frac{\pi}{2}} \log(\tan x) dx$



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43. Find the following integrals.

$$\int \frac{\sec^2 x}{\cos e^{c^2 x}} dx$$



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44. Find the following integrals

$$\int \frac{1}{x^2 - 6x + 13} dx$$



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45. Match the following. Justify your answer

A	B
$\int \frac{1}{1+x^2} dx$	$\sin^{-1} x + c$
$\int \frac{1}{\sqrt{1-x^2}} dx$	$x \tan^{-1} x - \frac{1}{2} \log(1+x^2) + c$
$\int \tan^{-1} x dx$	$\frac{(\tan^{-1} x)^2}{2} + c$
$\int \frac{\tan^{-1} x}{1+x^2} dx$	$\frac{1}{1+x^2} + c$
	$\tan^{-1} x + c$



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46. $\int \sin 2x dx =$

A. $2 \cos x + c$

B. $-2 \sin x + c$

C. $\frac{\cos 2x}{2} + c$

D. $-\frac{\cos 2x}{2} + c$

Answer:



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47. (i) Resolve $\frac{x^2 + 1}{x^2 - 5x + 6}$ into partial

fractions.

(ii) Hence evaluate $\int \frac{x^2 + 1}{x^2 - 5x + 6}$



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48. Evaluate. $\int_0^4 x dx$ as a limit of sum



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49. Define the real valued function

$$f(x) = |x^2 + 2x - 3|$$



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50. Evaluate $\int_0^2 |x^2 + 2x - 3| dx$



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51. Consider the function

$$f(x) = |x| + |x + 1|$$

define the function $f(x)$ in the interval

$[-2, 1]$



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52. Consider the function

$$f(x) = |x| + |x + 1|$$

Find the integral $\int_{-2}^1 f(x) dx$



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53. Evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1 + \sqrt{\tan x}} dx$



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54. Fill in the blanks.

$$\int \tan x dx = \dots$$



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55. Fill in the blanks

$$\int \cos x dx = \dots$$



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56. Fill in the blanks

$$\int \frac{1}{x} dx = \dots$$



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57. Evaluate $\int \sin^3 x \cos^2 x dx$



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58. Find the following integrals.

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



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59. Find the following integrals.

$$\int \frac{2x - 3}{x^2 + 3x - 18} dx$$



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60. Find the following integrals.

$$\int \frac{5x + 2}{1 + 2x + 3x^2} dx$$



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61. Find the following integral.

$$\int \frac{5x + 3}{\sqrt{x^2 + 4x + 10}} dx$$



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62. Consider the expression $\frac{1}{x^3 - 1}$

Split it into partial fraction.



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63. Consider the expression $\frac{1}{x^3 - 1}$

Split it into partial fraction.



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64. Match the following

A	B
$\int \sin 3x dx$	$\frac{x}{2} + \frac{1}{4} \sin 2x + c$
$\int x \sin x dx$	$\log(1+x^2) + c$
$\int \frac{2x}{1+x^2} dx$	$-\frac{1}{3} \cos 3x + c$
$\int \cos^2 x dx$	$2 \cos x \sin x + c$
	$-x \cos x + \sin x + c$
	$\log \tan x + c$



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65. consider the function $f(x) = \frac{x^4}{x+1}$

Evaluate $\int f(x) dx$



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66. (i) Evaluate the $\int_0^2 x^2 dx$ as the limit of a sum.

(ii) Hence evaluate $\int_{-2}^2 x^2 dx$



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67. Find $\int \sqrt{\tan x} dx$



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68. Match the following

A	B
$\int \frac{1}{1+x^2} dx$	$\cot^{-1} x + c$
$\int \sec^2 x dx$	$x^3 + c$
$\int 3x^2 dx$	$\tan x + c$
$\int \operatorname{cosec} x dx$	$\tan^{-1} x + c$
	$\log \left \tan \frac{x}{2} \right + c$



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69. Integrate $\frac{\sec^2 x}{5 \tan^2 x - 12 \tan x + 4}$



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70. Evaluate $\int_0^1 \sqrt{x} dx$



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71. (i) If $\int_0^a \sqrt{x} dx = 2a \int_0^{\frac{\pi}{2}} \sin^3 x dx$, find the value of a .

(ii) Hence find $\int_a^{a+1} x dx$



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72. Let $f(x)$ be a function, then $\int_0^a f(x) dx = ?$

A. $2 \int_0^a f(x - a) dx$

B. $\int_0^a f(a - x) dx$

C. $f(a)$

$$D. 2 \int_0^a f(a - x) dx$$

Answer:

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73. Evaluate

$$\int_0^2 \frac{\sqrt{x}}{\sqrt{x} + \sqrt{2-x}} dx$$

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74.
$$\int_0^{\frac{\pi}{2}} \frac{\sin x}{\sin x + \cos x} dx$$



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75. Find the following integrals

$$\int \frac{2e^x}{e^{3x} - 6e^{2x} + 11e^x - 6}$$



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76. Find the following integrals

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



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77. Find $\int \frac{1}{x^2 + a^2} dx$



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78. show that $3x + 1 = \frac{3}{4}(4x - 2) + \frac{5}{2}$



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79. Evaluate $\int \frac{3x + 1}{2x^2 - 2x + 3} dx$



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80. Find the Following integrals.

$$\int x^2 e^{2x} dx$$



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81. Find the Following integrals.

$$\int e^x \sin x dx$$



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

A. $e^x \cos x + c$

B. $e^x \sec x + c$

C. $e^x \tan x + c$

D. $e^x \sin x + c$

Answer:



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83. Find $\int \sin 2x \cos 3x dx$



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84. Find the following integrals.

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



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85. Find the following integrals.

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



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86. Consider the integral

$$I = \int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx$$

Express $I = \frac{\pi}{2} \int_0^{\pi} \frac{\sin x}{1 + \cos^2 x} dx$



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87. Consider the integral

$$I = \int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx$$

Show that $I = \frac{\pi^2}{4}$



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88. Evaluate: $\int_2^3 \frac{x}{x^2 + 1} dx$



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89. Evaluate: $\int_0^\pi \frac{x}{1 + \sin x} dx$



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90. Find $\int_0^1 (2x + 3) dx$ as the limit of a sum.



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91. Evaluate $\int_0^{\pi} \log(1 + \cos x) dx$



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92. Find $\int_0^5 (x + 1) dx$ as limit of a sum.



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93. Evaluate $\int_0^4 x^2 dx$ as the limit of a sum.



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94. Fill in the blanks $\int \frac{1}{x} dx = \text{---}$



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95. Evaluate $\int \frac{5x + 1}{x^2 - 2x - 35} dx$



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96. Integrate with respect to x . $\sqrt{x^2 + 4x + 8}$



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97. Evaluate $\int -\frac{\operatorname{cosec}^2 x}{\sqrt{\cot^2 x + 9}} dx$



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98. Evaluate $\int (\cos^{-1} x)^2 dx$



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



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100. Evaluate $\int_0^2 e^x dx$ as limit of a sum.



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101. Find $\int \cot x dx$



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102. Evaluate the integrals

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



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103. Evaluate the integrals

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



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104. Evaluate $\int_0^1 x dx$ as the limit of a sum.



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105. Evaluate $\int_0^1 x(1-x)^n dx$



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106. Evaluate $\int_1^2 \frac{1}{x(1 + \log x)^2} dx$



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107. Evaluate $\int_0^3 (2x^2 + 3) dx$ as the limit of a sum.



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108. What is $\int \frac{1}{9 + x^2} dx = ?$



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109. Evaluate the integrals

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



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110. Evaluate $\int_0^3 f(x) dx,$

$$\text{Where } f(x) = \begin{cases} x & + & 3 & & 0 \leq x \leq 2 \\ 3x & & & & 2 \leq x \leq 3 \end{cases}$$



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111. Prove that

$$\int_0^1 \log\left(\frac{x}{1-x}\right) dx = \int_0^1 \log\left(\frac{1-x}{x}\right) dx.$$

Find the value of $\int_0^1 \log\left(\frac{x}{1-x}\right) dx$



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112. Find $\int \cot x dx = \dots\dots$



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113. Find $\int x \log x dx$



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114. Find $\int \frac{x - 1}{(x - 2)(x - 3)} dx$



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115. Evaluate

$$\int \frac{x + 3}{\sqrt{5 - 4x - x^2}} dx$$



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116. Evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1 + \sqrt{\tan x}}$



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117. Evaluate

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



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118. Evaluate $\int_{-1}^2 |x^3 - x| dx$



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119. Evaluate. $\int_0^{\frac{\pi}{4}} \log(1 + \tan x) dx$



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120. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \cos x dx$



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121.

Prove

that

$$\int_0^{\pi} \frac{x}{a^2 \cos^2 x + b^2 \sin^2 x} dx = \frac{\pi^2}{2ab}$$



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122. $\int \frac{1}{x^2 + a^2} dx = \dots\dots$



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123. Find $\int \frac{1}{9x^2 + 6x + 5} dx$





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



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125. Integrate the following

$$\frac{x-1}{x+1}$$



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126. Integrate the following

$$\frac{\sin x}{\sin(x - a)}$$



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127. Integrate the following $\frac{1}{\sqrt{3 - 2x - x^2}}$



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128. Prove that $\int \cos^2 x dx = \frac{x}{2} + \frac{\sin 2x}{4} + c$



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

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130. Find $\int x \cos x dx$

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131. Find the following: $\int \frac{1}{x(x^7 + 1)} dx$

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132. Find the following: $\int_1^4 |x - 2| dx$



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133. Find $\int_0^{\frac{\pi}{2}} \log \sin x dx$



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134. Find the following:

$$\int \cot x \log(\sin x) dx$$



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135. Find the following:

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



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