MATHS

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INTEGRALS

Exercise

1. The value of $\int_{-2}^{4} |x+1| dx$ is equal to a)12 b)14 c)13 d)16

A. 16

B. 13

C. 2

D. 8

Answer:

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2. Consider $\int_0^{\pi/2} \frac{\sin 2\theta d\theta}{\sin^4\theta + \cos^4\theta}$ Show that value of the integral is $\frac{\pi}{2}$.

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3. Consider $\int_0^{\pi/2} \frac{\sin 2\theta d\theta}{\sin^4\theta + \cos^4\theta}$ Show that value of the integral is $\frac{\pi}{2}$.

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4. Consider $I = \int \frac{\sin x \cos x}{a^2 \sin^2 x + b^2 \cos^2 x} dx$ Put $a^2 \sin^2 x + b^2 \cos^2 x = t$ and show that $\sin x \cos x dx = \frac{dt}{2(a^2 - b^2)}$,

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5. Consider $I = \int \frac{\sin x \cos x}{a^2 \sin^2 x + b^2 \cos^2 x} dx$

Evaluate I.

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

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7. Let $I = \int_0^{\pi} \frac{e^{\cos x}}{e^{\cos x} + e^{-\cos x}} dx$ Hence evaluate I.

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8. Let $I = \int_0^{\pi} \frac{e^{\cos x}}{e^{\cos x} + e^{-\cos x}} dx$ Hence evaluate I.

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9. Evaluate $\int x \sin^2 x dx$.

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10. Evaluate $\int \frac{e^x}{\sqrt{5 - 4e^x - e^{2x}}} dx.$

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11. Evaluate $\int \frac{\log x}{x^2} dx.$

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12. Find $\int x^3 \log 2x dx.$

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13. Let $z = \sin x - \cos x$. Find $\frac{dz}{dx}$.

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14. Let z=sinx-cosx. Show that $1 - z^2 = \sin 2x$.

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15. Let z=sinx-cosx. Compute $\int \frac{\cos x + \sin x}{\sqrt{\sin 2x}}$

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16. Integral of $(4x+3)^{10}$=?

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

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18. If $x^n = t$, Show that $\frac{1}{x}dx = \frac{1}{nt}dt$ and hence evaluate $\int \frac{dx}{x(x^n+1)}$.

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19. If $e^x = t$, show that $dx = \frac{1}{t}dt$ and hence evaluate $\int \frac{dx}{1-e^x}$.

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

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21. Evaluate $\int \frac{x^2 - 1}{x^4 + x^2 + 1} dx.$

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22. Evaluate $\int \sin^5 x dx.$

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23. Evaluate $\int \sin^3 x \cos^4 x dx.$

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24. Evaluate $I = \int \frac{1}{1 + \cot x} dx.$

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25. Evaluate $\int \frac{1 - \tan x}{1 + \tan x} dx.$

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

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

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

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

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30. Consider $f(x) = \begin{cases} 4x+3 & 1 \le x \le 2 \\ 3x+5 & 2 \le x \le 4 \end{cases}$

Evaluate $\int_1^2 f(x)dx$ and $\int_2^4 f(x)dx$

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31. Consider $f(x) = \begin{cases} 4x+3 & 1 \leq x \leq 2 \\ 3x+5 & 2 \leq x \leq 4 \end{cases}$

Evaluate $\int_1^4 f(x)dx$

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32. Evaluate the following : $\int \frac{1}{1+e^x} dx.$

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33. Evaluate the following : $\int x^2 \cos x dx.$

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34. Evaluate the following integrals:

$$\int \frac{dx}{x\sqrt{x^6 - 25}}$$

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35. Evaluate the following integrals:

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

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36. Evaluate the following integrals:

$$\int (\log x)^2 dx.$$

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37. Evaluate $\int_0^1 \frac{x^2}{1+x^2}$.

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38. Find $\int_0^{\pi/4} \log(1+\tan x)dx$ using the property $\int_0^a f(x)dx = \int_0^a f(a-x)dx$.

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

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

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41. Find the following integrals.

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

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42. Evaluate the following integrals

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

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43. Evaluate the following integrals

$$\int \frac{1}{x^2 + 4x + 10} dx.$$

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44. Prove that

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

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

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

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47. Evaluate $\int \frac{\sin x}{\sin 3x} dx.$

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48. Integrate the following functions

$\sqrt{1-4x-x^2}$

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49. Integrate the following functions

$\sqrt{1+3x-x^2}$

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50. Integrate the following functions

$$\sqrt{1+\frac{x^2}{9}}$$

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51. Evaluate $\int_{-\pi/2}^{\pi/2} |\sin x| dx.$

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52. Evaluate

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

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53. Evaluate $\int_{-2}^{1} |2x+1| dx.$

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

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

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

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57. Choose the correct answer $\int_{-1}^{1} x dx$ is equal to

a)0 b)1 c)2 d)3

A. 0

B. 1

C. 2

D. 3

Answer:

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58. Choose the correct answer $\int_3^9 \frac{3}{x} dx$ is equal to

a)3log3 b)log3 c) 9log3 d)3log9

A. 3log3

B. log3

C. 9log3

D. 3log9

Answer:

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59. Choose the correct answer from the bracket. Verify your answer. $\int_0^{\frac{n}{2}} \sin x dx$

A. 0

B. -1

C. 1

D. 2

Answer:

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60. Choose the correct answer $\int_{-2}^{4} |x+1| dx$ is equal to

a)12 b)13 c)14 d)15

A. 12

B. 13

C. 14

D. 15

Answer:

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61. Evaluate $\int\left(x^6-2x^4+2x^2\right)dx.$

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

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63. Evaluate $\int \frac{1}{t^2} dt.$

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64. Evaluate $\int \frac{\cos x - \sin x}{1+2\sin x \cos x} dx.$

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65. Evaluate $\int_0^1 e^{-5x}\,dx.$

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66. Evaluate $\int_0^1 xe^{-5x}\,dx.$

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67. Evaluate the following definite integral as the limit of a sum $\int_0^4 (x+1)dx$.

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68. Integrate the following functions:

$$\frac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha}$$

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69. Integrate xcosx with respect to x.

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70. Evaluate $\int x^2 \sin x dx$.

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71. Find the following integrals.

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

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72. Evaluate $\int \frac{e^x(1+\sin x)}{1+\cos x} dx.$

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

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

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75. Given that $I = \int \frac{e^x(1+x)}{\cos(xe^x)} dx$ Find the derivative of xe^x

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

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77. Evaluate

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

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

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

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

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81. Evaluate the following integrals

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

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82. Evaluate the following integrals

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

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83. Evaluate the following integrals $\int \frac{e^{\tan^{-1} x}}{1+x^2} dx.$

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84. Consider the integral $I = \int \frac{xe^x}{(1+x)^2} dx$

Express the integral I in the form of $\int e^x \{f(x) + f'(x)\} dx.$

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85. Consider the integral $I = \int \frac{xe^x}{(1+x)^2} dx$

What is the value of I

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86. Consider the integral $I = \int \frac{xe^x}{(1+x)^2} dx$

What is the value of I

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

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88. Integrate the following functions sinx sin(cosx).

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89. Evaluate $\int x^2 \log x dx.$

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90. Evaluate $\int \frac{(3\sin\theta - 2)\cos\theta}{5 - \cos^2\theta - 4\sin\theta} d\theta$

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

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92. Evaluate $\int \log x dx.$

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93. $\int \frac{f(x)}{\tan x} dx = \log|\tan x| + c$, then $f(x)$ is

A. cot x

B. $\sec^2 x$

C. $\cos ec^2 x$

D. $\cot^2 x$

Answer:

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94. If $\frac{d}{dx}f(x) = 4x^3 - \frac{3}{x^4}$ such that $f(2) = 0$, then $f(x)$ is a) $x^4 + \frac{1}{x^3} - \frac{129}{8}$ b) $x^3 + \frac{1}{x^4} + \frac{129}{8}$ c) $x^4 + \frac{1}{x^3} + \frac{129}{8}$ d) $x^3 + \frac{1}{x^4} - \frac{129}{8}$

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95. Integrate the following

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

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96. Integrate the following

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

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97. Integrate the following $\int_0^{\frac{\pi}{2}} x \cos x dx$

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98. If $\int f(x)dx = \log|\tan x| + C$. Find $f(x)$

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99. Evaluate $\int \frac{1}{\sqrt{1-4x^2}} dx$

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100. If $2x+4 = A(2x+3)+B$, find A and B

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101. If $2x+4 = A(2x+3)+B$, find A and B and evalute $\int \frac{2x+4}{x^2+3x+1} dx$

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

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103. Evaluate the following:

$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^7 x dx$

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104. Evaluate the following:

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

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105. $\int_0^a f(a-x)dx$ =..... a) $\int_0^{2a} f(x)dx$ b) $\int_{-a}^{a} f(x)dx$ c) $\int_0^a f(x)dx$ d) $\int_a^0 f(x)dx$

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

B. $\int_{-a}^{a} f(x)dx$

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

D. $\int_a^0 f(x)dx$

Answer:

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106. Find the value of

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

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107. Evaluate $\int_0^2 \left(x^2+1\right)dx$

as the limit of a sum

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108. Evaluate the following : $\int \sin mx dx$

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109. Integrate the following functions

$$\frac{1}{\sqrt{x^2+2x+2}}$$

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

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

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

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

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

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

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

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117. Find $\int \frac{x^2}{1-x^6} dx$

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118. Integrate the following functions

$$\frac{4x+1}{\sqrt{2x^2+x-3}}$$

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119. Evaluate : $\int_{1/4}^{1} |2x-1|dx.$

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120. Evaluate : $\int \frac{\cot x}{\log \sin x} dx$

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121. Prove the following: $\int_0^1 xe^x dx = 1$

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122. Choose the correct answer

$\int_0^1 \tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right)dx =$

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