MATHS

BOOKS - CENGAGE MATHS (ENGLISH)

INDEFINITE INTEGRATION

Illustration

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

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2. Evaluate $\int \frac{2^{x+1} - 5^{x-1}}{10^x}$

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3. Evaluate $\int \sec^2 x \operatorname{cosec}^2 x dx$.

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4. Evaluate $\int \frac{1 - \cos x}{1 + \cos x} dx$.

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

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6. Evaluate: $\int \tan^{-1} \left\{ \sqrt{\left(\frac{1 - \cos x}{2 + \cos 2x} \right)} \right\}$

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7. Evaluate: $\int \frac{\sec x}{\sec x + \tan x} dx$.

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

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9. $\int \cos^3 x \quad dx =$

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10. Evaluate: $\int \frac{8x + 13}{\sqrt{4x + 7}} \, dx$

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

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12. Evaluate: $\int \sin^4 x \, dx$

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13. Evaluate $\int \sin 2x \sin 3x dx$.

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14. Evaluate: $\int \frac{dx}{(2x - 7)(x - 7)(x - 4)}$

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15. Find the values of a and b such that $\int \frac{dx}{1 + \sin x} = \tan\left(\frac{x}{2} + a\right) + b$

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16. Evaluate the following:

(i) $\int \frac{\sec^2 x}{3+\tan x} dx$ (ii) $\int \frac{e^x - e^{-x}}{e^x + e^{-x}} dx$

(iii) $\int \frac{1-\tan x}{1+\tan x} dx$ (iv) $\int \frac{1}{1+e^{-x}} dx$

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17. Evaluate the following :

(i) $\int \left(x + \frac{1}{x}\right)^{3/2} \left(\frac{x^2-1}{x^2}\right) dx$ (ii) $\int \frac{\sqrt{2+\log x}}{x} dx$

(iii) $\int \frac{\left(\sin^{-1} x\right)^3}{\sqrt{1-x^2}} dx$ (iv) $\int \frac{\cot x}{\sqrt{\sin x}} dx$

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

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

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20. Evaluate: $\int \frac{\log\left(\tan\left(\frac{x}{2}\right)\right)}{\sin x} dx$

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21. Evaluate: $\int \tan^4 x dx$

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22. Evaluate: $\int \sec^p x \tan x dx$

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

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

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25. Evaluate $\int\left(x^6+x^4+x^2\right)\sqrt{2x^4+3x^2+6}dx.$

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26. Evaluate $\int \sin 2x d(\tan x).$

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

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28. Evaluate the following integration

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

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29. Evaluate $\int \tan x \tan(x + 1) dx$.

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

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31. Evaluate: $\int \frac{1}{\sin(x-a)\sin(x-b)}\,dx$

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

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

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

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35. Evaluate $\int \frac{dx}{\left(x^3+3x^2+3x+1\right)\sqrt{x^2+2x-3}}$

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

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37. Evaluate: $\int \sin\left(e^x\right)d\left(e^x\right)$

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

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39. Evaluate: $\int 2^{2^{2^x}} \cdot 2^{2^x} \cdot 2^x dx$

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40. Evaluate: $\int \frac{e^{\sqrt{x}} \cos\left(e^{\sqrt{x}}\right)}{\sqrt{x}} dx$

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41. Find $\int \frac{e^x(1+x)}{\cos^2\left(xe^x\right)} dx$

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42. $\int 5^{x+\tan^{-1}x} \cdot \left(\frac{x^2+2}{x^2+1}\right) dx.$

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

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44. Evaluate: $\int\left(\left(\frac{e}{x}\right)^x + \left(\frac{x}{e}\right)^x\right)1nxdx$.

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45. Evaluate $\int\frac{1}{\sqrt{e^{5x}}\sqrt[4]{\left(e^{2x} + e^{-2x}\right)^3}}$.

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46. Find $\int\sin^5 x dx$.

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47. Find $\int \sin^3 x \cos^5 x dx$.

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48. Find $\int \frac{dx}{\sin x \cos^3 x}$.

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

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

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51. Evaluate: Evaluate: $\int x^{-11}\left(1+x^4\right)^{-\frac{1}{2}}dx$

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

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53. Evaluate: $\int \frac{1}{\left[(x-1)^3(x+2)^5\right]^{\frac{1}{4}}}dx$

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

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

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56. Evaluate: $\int \frac{\cos x}{\sin\left(x - \frac{\pi}{6}\right)\sin\left(x + \frac{\pi}{6}\right)} dx$

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

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

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

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60. Evaluate: $\int \frac{4x+1}{x^2+3x+2}\,dx$

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

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

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63. Evaluate: $\int \frac{x^2 + 4}{x^4 + 16} dx$

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64. Evaluate: $\int \sqrt{\tan\theta} d\theta$

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

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

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67. Evaluate: (i) $\int \frac{e^x}{\sqrt{4 - e^{2x}}}\, dx$ (ii) $\int \frac{x^2}{\sqrt{1 - x^6}}\, dx$

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68. Evaluate $\int \frac{\tan x dx}{\sqrt{2 + 3\tan^2 x}}$.

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69. Evaluate: $\int \sqrt{\sec x - 1}\, dx$

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70. Evaluate: $\int \sqrt{\frac{1 + x}{x}}\, dx$

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

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

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

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

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

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

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

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

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

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80. Evaluate: $\int \frac{\sin x}{2 + \sin 2x} dx$

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

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

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83. Evaluate: $\int \frac{1}{\sin x - \sin 2x} dx$

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84. Evaluate: $\int \frac{(x-1)(x-2)(x-3)}{(x-4)(x-5)(x-6)} dx$

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

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86. Evaluate: $\int \frac{\sin x}{\sin 4x} dx$

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

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

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89. Evaluate: $\int \frac{(\log)_{ex}e\log_{e^2}e\log_{e^3}x e}{x}dx$

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90. Evaluate $\int x\sin 3x dx$.

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

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

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93. Evaluate $\int x^2 e^{x^2} (2x) dx$.

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

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

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96. Evaluate: $\int (x) is polynomial function of the nth degree, prove that -$

$\int e^x f(x)dx = e^x\left[f(x)f'(x) + f^x = f^x + \ + (-1)^n f^{(n)}(x)\right]$ Where

$f^{(n)}(x)de \neg es \frac{d^n f}{dx^n}$

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

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

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

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100. Evaluate $\int \sin(\log x) dx$.

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101. Evaluate: $\int e^{\sin} \wedge ((-1)x) dx$

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

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

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104. Evaluate: $\int (x - 5)\sqrt{x^2 + x}\, dx$

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

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

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

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108. Evaluate: $\int e^x \left(\frac{1}{x} - \frac{1}{x^2} \right) dx$.

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

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

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

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

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Example

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

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

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

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

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

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

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7. If $I_n = \int \cos^n x dx$. Prove that $I_n = \frac{1}{n}\left(\cos^{n-1} x \sin x\right) + \left(\frac{n-1}{n}\right) I_{n-2}$.

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

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9. Evaluate: $\int \frac{e^{\tan \wedge -1(x)}}{\left(1 + x^2\right)} \left[\left(\sec^{-1}\sqrt{1 + x^2}\right)^2 + \cos^{-1}\left(\frac{1 - x^2}{1 + x^2}\right)\right] dx (x > 0)$.

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

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11. Evaluate $\int \frac{xdx}{x^3\sqrt{x^2 - 1}}$.

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12. Evaluate: $\int \sqrt{\frac{3 - x}{3 + x}} \sin^{-1}\left(\frac{1}{6}\sqrt{3 - x}\right) dx$

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13. Evaluate: $\int \cos 2\theta \ln\left(\frac{\cos\theta + \sin\theta}{\cos\theta - \sin\theta}\right) d\theta$

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14. Evalaute $\int x^{-1/2}\left(2 + 3x^{1/3}\right)^{-2} dx$.

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15. Evaluate: $\int \sin^{-1}\left(\frac{2x+2}{\sqrt{4x^2+8x+13}}\right)dx$

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16. Evaluate: for $m \in N$, $\int x^{3m}+x^{2n}+x^m\left(2x^{2m}+3x^m+6\right)^{\frac{1}{m}}dx, x>0$

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

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18. $\int\left(\sin(101x).\sin^{99}x\right)dx$ equals

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Concept Application Exercise 7 1

1. Evaluate $\int(\sec x + \tan x)^2 dx$

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

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3. Evaluate: $\int a^{mx} b^{nx} dx$

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

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5. If $\int \frac{1}{x + x^5} dx = f(x) + c$, the $\neq$ valuate $\int \frac{x^4}{x + x^5} dx$.

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6. Evaluate: (i) $\int \frac{\left(x^3 + 8\right)(x - 1)}{x^2 - 2x + 4} dx$ (ii) $\int (a\tan x + b\cot x)^2 \, dx$

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7. Solve the following integration

$$\int \frac{\sin^6 x + \cos^6 x}{\sin^2 x \cdot \cos^2 x} dx$$

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8. Evaluate $\int \tan^{-1}(\sec x + \tan x) dx, \ -\pi/2 < x < \pi/2$

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9. Evaluate: $\int \frac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha} dx$

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Concept Application Exercise 7 2

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

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2. Evaluate: $\int \left(1 + 2x + 3x^2 + 4x^3 + \right) dx, (< |x| < 1)$

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

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4. Evaluate: $\int \frac{e^{3x} + e^{5x}}{e^{x} + e^{-x}} dx$

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5. Evaluate $\int \tan^2 x \sin^2 x dx$

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

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7. Evaluate $\int \sin x \cos x \cos 2x \cos 4x \cos 8x dx$

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Concept Application Exercise 7 3

1. Evaluate $\int \frac{dx}{x + x\log x}$

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2. Evaluate $\int \frac{x + 1}{x\left(x + \log_e x\right)} dx$

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3. Evaluate: (i) $\int \{1 + \tan x \tan(x + \theta)\}\, dx$ (ii) $\int \frac{\sin 2x}{\sin\left(x - \frac{\pi}{6}\right)\sin\left(x + \frac{\pi}{6}\right)} dx$

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

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

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6. $I = \int \frac{\log_e\left(\log_e x\right)}{x\left(\log_e x\right)} dx$

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

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

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9. Evaluate $\int \text{cosec}^4 x dx$

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10. Evaluate $\int \frac{\sin^6 x}{\cos^8 x} dx$

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

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12. Evaluate: $\int \frac{\sin x}{\sin(x-a)} dx$

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

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14. Evaluate $\int \frac{dx}{\cot^2 x - 1}$

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

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16. $I = \int \frac{dx}{\left(2ax + x^2\right)^{\frac{3}{2}}}$

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Concept Application Exercise 7 4

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

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

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

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4. Evaluate $\int \frac{dx}{x + \sqrt{x}}$

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

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

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

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8. Evaluate: $\int \frac{ax^{3} + bx}{x^{4} + c^{2}} dx$

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

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10. Evaluate $\int e^{3\log x}\left(x^4+1\right)^{-1}dx$

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11. Evaluate: $\int \frac{\sec x dx}{\sqrt{\cos 2x}}$

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

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13. Evaluate: $\int \frac{ddx}{\sqrt{1+x^2}+\sqrt{\left(1+x^2\right)^3}}$

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

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

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

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17. Evaluate: $\int \frac{\left(x^4 - x\right)^{1/4}}{x^5} dx$

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18. Evaluate: $\int x^x 1n(ex)dx$

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19. Evaluate: $\int \frac{dx}{(x - p)\sqrt{(x - p)(x - q)}}$

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20. Evaluate: $\int \frac{\left[\sqrt{1 + x^2} + x\right]^n}{\sqrt{1 + x^2}} dx$

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Concept Application Exercise 7 5

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

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

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3. Evaluate: $\int \frac{x^2}{x^6 + a^6}\, dx$

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4. Evaluate: $\int \frac{\sin x}{\cos 2x}\, dx$

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

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

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

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

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

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Concept Application Exercise 7 6

1. Evaluate: $\int \frac{x^2}{\sqrt{1-x^6}} dx$

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

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3. Evaluate: $\frac{1}{\sqrt{1-e^{2x}}} dx$

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

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5. Evaluate: $\int \frac{x^{\frac{5}{2}}}{\sqrt{1+x^7}}dx$

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6. Evaluate $\int \sqrt{1+\text{cosec}x}dx, (\pi/2 < x < \pi)$

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Concept Application Exercise 7 7

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

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2. Evaluate: $\int \frac{dx}{9 + 16\sin^2 x}$

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

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

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

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

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

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

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

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

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Concept Application Exercise 7 8

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

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

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

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

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5. Evaluate $\int \frac{dx}{\sin x\left(3 + \cos^2 x\right)}$

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

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

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Concept Application Exercise 7 9

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

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2. Evaluate $\int \cos \sqrt{x} dx$

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

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4. Evaluate: If $\int f(x)dx = g(x), then \int f^{-1}(x)dx$

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5. Evaluate: $\int [f(x)g''(x) - f''(x)g(x)]dx$

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6. Evaluate: If $\int f(x)dx = g(x), then \int f^{-1}(x)dx$

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7. Evaluate $\int \left(\log_e x\right)^2 dx$

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

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

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10. Evaluate: $\int \cos x \log\left(\tan\frac{x}{2}\right)dx$

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

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12. Evaluate: $\int e^x\left(1+\tan x+\tan^2 x\right)dx$

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

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

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15. Evaluate $\int\sqrt{x^2+2x+5}dx$

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Exercises Single Correct Answer Type

1. $I = \int \frac{\sin^8 x - \cos^8 x}{1 - 2sij^2 x\cos^2 x} dx$ is equal to:

A. $\frac{1}{2}\sin 2x + C$

B. $-\frac{1}{2}\sin 2x + C$

C. $-\frac{1}{2}\sin x + C$

D. $-\sin^2 x + C$

Answer: B

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2. If $\int \frac{\cos 4x + 1}{\cot x - \tan x} dx = A\cos 4x + B,$ then

A. $A = -1/2$

B. $A = -1/8$

C. $A = -1/4$

D. none of these

Answer: B

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3. $\int\left(\sqrt{\frac{a+x}{a-x}}+\sqrt{\frac{a-x}{a+x}}\right)dx$ is equal to

A. $2\sin^{-1}(x/a)+c$

B. $2a\sin^{-1}(x/a)+c$

C. $2\cos^{-1}(x/a)+c$

D. $2a\cos^{-1}(x/a)+c$

Answer: B

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4. $\int\sqrt{1+\sin x}dx$ is equal to

A. $-2\sqrt{1-\sin x}+C$

B. $\sin(x/2)+\cos(x/2)+C$

C. $\cos(x/2)-\sin(x/2)+C$

D. $2\sqrt{1-\sin x}+C$

Answer: A

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

A. $\cos x+\frac{1}{2}\cos 2x-\frac{1}{3}\cos 3x+C$

B. $\cos x-\frac{1}{2}\cos 2x-\frac{1}{3}\cos 3x+C$

C. $\cos x+\frac{1}{2}\cos 2x+\frac{1}{3}\cos 3x+C$

D. $\cos x-\frac{1}{2}\cos 2x+\frac{1}{3}\cos 3x+C$

Answer: B

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6. If $\int\sqrt{1+\sin x}f(x)dx = \frac{2}{3}(1+\sin x)^{3/2}+c$, then $f(x)$ equals

A. $\cos x$

B. $\sin x$

C. $\tan x$

D. 1

Answer: A

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7. $\int\frac{\sqrt{x-1}}{x\sqrt{x+1}}dx$ is equal to

A. $\text{In}\left|x-\sqrt{x^2-1}\right|-\tan^{-1}x+c$

B. $\text{In}\left|x+\sqrt{x^2-1}\right|-\tan^{-1}x+c$

C. $\text{In}\left|x-\sqrt{x^2-1}\right|-\sec^{-1}x+c$

D. $\text{In}\left|x+\sqrt{x^2-1}\right|-\sec^{-1}x+c$

Answer: D

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8. $IfI=\int\frac{dx}{\sec x+\operatorname{cosec}x}, thenIequals$

$\frac{1}{2}\left(\cos x+\sin x-\frac{1}{\sqrt{2}}\log(\operatorname{cosec}x-\cos x)\right)+C$

$\frac{1}{2}\left(\sin x-\cos x-\frac{1}{\sqrt{2}}\log|\operatorname{cosec}x+\cot x|\right)+C$

$\frac{1}{\sqrt{2}}\left(\sin x+\cos x+\frac{1}{2}\log|\operatorname{cosec}x-\cos x|\right)$

$\frac{1}{2}[\sin x-\cos x]-\frac{1}{\sqrt{2}}\log\left|\operatorname{cosec}\left(x+\frac{\pi}{4}\right)\right.$

A. $\frac{1}{2}\left(\cos x+\sin x-\frac{1}{\sqrt{2}}\log(\operatorname{cosec}x-\cos x)\right)+C$

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

C. $\frac{1}{\sqrt{2}}\left(\sin x+\cos x+\frac{1}{2}\log|\operatorname{cosec}x-\cos x|\right)+C$

D. $\frac{1}{2}[\sin x - \cos x] - \frac{1}{\sqrt{2}}\log|\operatorname{cosec}(x + \pi/4) - \cot(x + \pi/4)| + C$

Answer: D

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9. $\int \frac{\sin x}{\sin\left(x - \frac{\pi}{4}\right)} dx$ is equal to

A. $\frac{1}{\sqrt{2}}\left(x + \log_e\left|\cos\left(x - \frac{\pi}{4}\right)\right|\right) + c$

B. $\frac{1}{\sqrt{2}}\left(x - \log_e\left|\sin\left(x - \frac{\pi}{4}\right)\right|\right) + c$

C. $\sqrt{2}\left(x + \log_e\left|\sin\left(x - \frac{\pi}{4}\right)\right|\right) + c$

D. $\frac{1}{\sqrt{2}}\left(x + \log_e\left|\sin\left(x - \frac{\pi}{4}\right)\right|\right) + c$

Answer: D

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10. Evaluate: $\int \frac{\cos 5x + \cos 4x}{1 - 2\cos 3x} dx$

A. $\frac{\sin 2x}{2} + \cos x + c$

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

C. $-\frac{\sin 2x}{2} - \sin x + c$

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

Answer: C

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11. $If I = \int \sqrt{\frac{5 - x}{2 + x}} dx$, $then I equal$ $\sqrt{x + 2}\sqrt{5 + x} + 3\sin^{-1}\sqrt{\frac{x + 2}{3}} + C$ $\sqrt{x + 2}\sqrt{5 - x} + 7\sin^{-1}\sqrt{\frac{x + 2}{7}} + C$ $\sqrt{x + 2}\sqrt{5 - x} + 5\sin^{-1}\sqrt{\frac{x + 2}{5}} + C$ none of these

A. $\sqrt{x + 2}\sqrt{5 - x} + 3\sin^{-1}\sqrt{\frac{x + 2}{3}} + C$

B. $\sqrt{x + 2}\sqrt{5 - x} + 7\sin^{-1}\sqrt{\frac{x + 2}{7}} + C$

C. $\sqrt{x+2}\sqrt{5-x}+5\sin^{-1}\sqrt{\frac{x+2}{5}}+C$

D. non of these

Answer: B

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12. $\int \frac{\sin 2x}{\sin 5x \sin 3x} dx$ is equal to

A. $\log\sin 3x - \log\sin 5x + c$

B. $\frac{1}{3}\log\sin 3x + \frac{1}{5}\log\sin 5x + c$

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

D. $3\log\sin 3x - 5\log\sin 5x + c$

Answer: C

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13. $\int \frac{dx}{x\left(x^n+1\right)}$ is equal to

A. $\frac{1}{n}\log\left(\frac{x^n}{x^n+1}\right)+c$

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

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

D. non of these

Answer: A

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14. Evaluate: $\int \frac{1}{\sqrt{\sin^3 x \sin(x+\alpha)}}dx,\ \alpha \neq n\pi,\ \ n \in Z$

A. $-2\text{cosec}\alpha(\cos\alpha - \tan x \sin\alpha)^{1/2}+C$

B. $-2(\cos\alpha + \cot x \sin\alpha)^{1/2}+C$

C. $-2\text{cosec}\alpha(\cos\alpha - \cot x\sin\alpha)^{1/2} + C$

D. $-2\text{cosec}\alpha(\sin\alpha - \cot x\cos\alpha)^{1/2} + C$

Answer: C

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15. $\int \frac{px^{p+2q-1} - qx^{q-1}}{x^{2p+2q} + 2x^{p+q} + 1} dx$ is equal to

(1) $-\frac{x^p}{x^{p+q}+1} + C$

(2) $\frac{x^q}{x^{p+q}+1} + C$

(3) $-\frac{x^q}{x^{p+q}+1} + C$

(4) $\frac{x^p}{x^{p+q}+1} + C$

A. $-\frac{x^p}{x^{p+q}+1} + C$

B. $\frac{x^q}{x^{p+q}+1} + C$

C. $-\frac{x^q}{x^{p+q}+1} + C$

D. $\frac{x^p}{x^{p+q}+1} + C$

Answer: C

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16. If $y = \int \frac{1}{\left(1 + x^2\right)^{\frac{3}{2}}} dx$ and $y = 0$ when $x = 0$, then value of y when $x = 1$ is

A. $\frac{1}{\sqrt{2}}$

B. $\sqrt{2}$

C. $2\sqrt{2}$

D. none of these

Answer: A

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17. $\int \sqrt{x}\left(1 + x^{1/3}\right)^4 dx$ is equal to

A. $2\left\{x^{2/3}+\frac{4}{11}x^{11/6}+\frac{6}{13}x^{13/6}+\frac{4}{15}x^{5/2}+\frac{1}{17}x^{17/6}\right\}+c$

B. $6\left\{x^{2/3}-\frac{4}{11}x^{11/6}+\frac{6}{13}x^{13/6}-\frac{4}{15}x^{5/2}+\frac{1}{17}x^{17/6}\right\}+c$

C. $6\left\{\frac{1}{9}x^{3/2}+\frac{4}{11}x^{11/6}+\frac{6}{13}x^{13/6}+\frac{4}{15}x^{5/2}+\frac{1}{17}x^{17/6}\right\}+c$

D. non of these

Answer: C

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18. $\int\frac{In(\tan x)}{\sin x\cos x}dx$ is equal to

A. $\frac{1}{2}In(\tan x)+c$

B. $\frac{1}{2}In\left(\tan^2 x\right)+c$

C. $\frac{1}{2}(In(\tan x))^2+c$

D. non of these

Answer: C

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19. If m is a non-zero number and $\int \frac{x^{5m-1}+2x^{4m-1}}{\left(x^{2m}+x^{m}+1\right)^{3}}dx = f(x)+c$, then f(x) is:

A. $\frac{x^{6m}+x^{2m}}{2m\left(x^{2m}+x^{m}+1\right)^{2}}+c$

B. $\frac{x^{4m}}{2m\left(x^{2m}+x^{m}+1\right)^{2}}+c$

C. $\frac{2mx^{4m}}{\left(x^{2m}+x^{m}+1\right)^{2}}+c$

D. $\frac{mx^{5m}}{2\left(x^{2m}+x^{m}+1\right)^{2}}+c$

Answer: B

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20. If $l^r(x)$ means $\log\log\log\ldots\ldots x$ being repeated r times, then $\int\left[\left(xl(x)l^2(x)l^3(x)\ldots. l^r(x)\right]^{-1}dx$ is equal to :

A. $l^{r+1}(x)+C$

B. $\frac{l^{r+1}(x)}{r+1}+C$

C. $l^r(x)+C$

D. non of these

Answer: A

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21. Find $\int\left[\sqrt{\cot x}+\sqrt{\tan x}\right]dx$

A. $\sqrt{2}\log\left(\sqrt{\tan x}-\sqrt{\cot x}\right)+C$

B. $\sqrt{2}\log\left|\sin x+\cos x+\sqrt{\sin 2x}\right|+C$

C. $\sqrt{2}\log\left|\sin x-\cos x+\sqrt{2}\sin x\cos x\right|+C$

D. $\sqrt{2}\log\left|\sin(x+\pi/4)+\sqrt{2}\sin x\cos x\right|+C$

Answer: B

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22. If $I=\int\frac{\sin 2x}{(3+4\cos x)^3}dx$, then I equals

A. $\frac{3\cos x+8}{(3+4\cos x)^2}+C$

B. $\frac{3+8\cos x}{16(3+4\cos x)^2}+C$

C. $\frac{3+\cos x}{(3+4\cos x)^2}+C$

D. $\frac{3-8\cos x}{16(3+4\cos x)^2}+C$

Answer: B

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

A. $\frac{1}{2}\left(\text{In}\left(\frac{x-1}{x+1}\right)\right)^2 + C$

B. $\frac{1}{2}\left(\text{In}\left(\frac{x+1}{x-1}\right)\right)^2 + C$

C. $\frac{1}{4}\left(\text{In}\left(\frac{x-1}{x+1}\right)\right)^2 + C$

D. $\frac{1}{4}\left(\text{In}\left(\frac{x+1}{x-1}\right)\right)$

Answer: C

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24. $\int \sqrt{e^x - 1} dx$ is equal to

A. $2\left[\sqrt{e^x - 1} - \tan^{-1}\sqrt{e^x - 1}\right] + c$

B. $\sqrt{e^x - 1} - \tan^{-1}\sqrt{e^x - 1} + c$

C. $\sqrt{e^x - 1} + \tan^{-1}\sqrt{e^x - 1} + c$

D. $2\left[\sqrt{e^x - 1} + \tan^{-1}\sqrt{e^x - 1}\right] + c$

Answer: A

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

A. $\frac{1}{4}\log_e\left|\frac{1 - \sqrt{1 - x^4}}{1 + \sqrt{1 - x^4}}\right| + \frac{1}{2}\sin^{-1}\left(x^2\right) + C$

B. $\frac{1}{2}\log_e\left|\frac{1 - \sqrt{1 - x^4}}{1 + \sqrt{1 - x^4}}\right| + \frac{1}{2}\cos^{-1}\left(x^2\right) + C$

C. $\frac{1}{2}\log_e\left|\frac{1 - \sqrt{1 - x^4}}{1 + \sqrt{1 - x^4}}\right| + \sin^{-1}\left(x^2\right) + C$

D. $\log_e\left|\frac{1 - \sqrt{1 - x^4}}{1 + \sqrt{1 - x^4}}\right| + \frac{1}{2}\cos^{-1}\left(x^2\right) + C$

Answer: A

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26. $\int \frac{\sqrt{x^2 + 10x + 24}}{x + 5} dx$ is equal to

A. $\sqrt{x^2 + 10x + 24} + \sec^{-1}(x + 5) + c$

B. $\sqrt{x^2 + 10x + 24} - \text{cosec}^{-1}(x + 5) + c$

C. $\sec^{-1}(x + 5) - \sqrt{x^2 + 10x + 24} + c$

D. $\sqrt{x^2 + 10x + 24} - \sec^{-1}(x + 5) + c$

Answer: D

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

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

Answer: A

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28. If $\int x^5\left(1+x^3\right)^{2/3}dx = A\left(1+x^3\right)^{8/3}+B\left(1+x^3\right)^{5/3}+c,$ then

A. $A=\frac{1}{4}, B=\frac{1}{5}$

B. $A=\frac{1}{8}, B=-\frac{1}{5}$

C. $A=-\frac{1}{8}, B=\frac{1}{5}$

D. non of these

Answer: B

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

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

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

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

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

Answer: B

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30. $\int \frac{x+2}{\left(x^2+3x+3\right)\sqrt{x+1}}dx$ is equal to

A. $\frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{x}{\sqrt{3(x+1)}}\right)$

B. $\frac{2}{\sqrt{3}}\tan^{-1}\left(\frac{x}{\sqrt{3(x+1)}}\right)$

C. $\frac{2}{\sqrt{3}}\tan^{-1}\left(\frac{x}{\sqrt{x+1}}\right)$

D. non of these

Answer: B

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31. Evaluate the following Integrals :

$$\int \frac{\sec x.\, dx}{\sqrt{\sin(x + 2A) + \sin A}}$$

A. $\frac{\sec A}{\sqrt{2}}\sqrt{\tan x \cos A - \sin A} + c$

B. $\sqrt{2}\sec A\sqrt{\tan x \cos A - \sin A} + c$

C. $\sqrt{2}\sec A\sqrt{\tan x \cos A + \sin A} + c$

D. non of these

Answer: C

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32. $\int \frac{\cos 2x}{\left(e^{-x} + \cos x\right)\sqrt{1 + \sin 2x}} dx, x \in \left(0, \frac{\pi}{2}\right)$ is equal to

A. $\log_e \left|1 + e^x \sin x\right| + c$

B. $\log_e \left|e^x + \cos x\right| + c$

C. $\log_e \left|1 + e^x \cos x\right| - x + c$

D. $\log_e \left|1 + e^x \cos x\right| + c$

Answer: D

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33. $\int \frac{\cos 4x - 1}{\cot x - \tan x} dx$ is equal to

A. $\frac{1}{2} In|\sec 2x| - \frac{1}{4}\cos^2 2x + c$

B. $\frac{1}{2} In|\sec 2x| + \frac{1}{4}\cos^2 x + c$

C. $\frac{1}{2} In|\cos 2x| - \frac{1}{4}\cos^2 2x + c$

D. $\frac{1}{2} In|\cos 2x| + \frac{1}{4}\cos^2 x + c$

Answer: C

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34. If $\int \frac{dx}{x^2\left(x^n+1\right)^{\frac{n-1}{n}}} = -(f(x))^{\frac{1}{n}} + C$ then $f(x)$ is (A) $1+x^n$ (B) $1+x^{-n}$ (C) $x^n + x^{-n}$ (D) $x^n - x^{-n}$

A. $\left(1+x^n\right)$

B. $1+x^{-n}$

C. $x^n + x^{-n}$

D. non of these

Answer: B

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35. $\int \sqrt{\frac{\cos x - \cos^3 x}{1-\cos^3 x}}\, dx$ is equal to

A. $\frac{2}{3}\sin^{-1}\left(\cos^{3/2} x\right) + C$

B. $\frac{3}{2}\sin^{-1}\left(\cos^{3/2}x\right)+C$

C. $\frac{2}{3}\cos^{-1}\left(\cos^{3/2}x\right)+C$

D. non of these

Answer: C

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36. $\int x\left(\left(\frac{\ln a^{\frac{x}{2}}}{3a^{\frac{5x}{2}}b^{3x}}+\frac{\ln b^{b}\wedge x}{2a^{2x}b^{4x}}\right)dx\left(wherea,b\in R^{+}\right)isequa<o\right.$

$\frac{1}{6\ln a^2b^3}a^{2x}b^{3x}\frac{\ln\left(a^{2x}b^{3x}\right)}{e}+k$ $\frac{1}{6\ln a^2b^3}\frac{1}{a^{2x}b^{3x}}\frac{\ln 1}{ea^{2x}b^{3x}}+k$

$\frac{1}{6\ln a^2b^3}\frac{1}{a^{2x}b^{3x}}\ln\left(a^{2x}b^{3x}\right)+k$ - $\frac{1}{6\ln a^2b^3}\frac{1}{a^{2x}b^{3x}}\ln\left(a^{2x}b^{3x}\right)+k$

A. $\frac{1}{6Ina^2b^3}a^{2x}b^{3x}In\frac{a^{2x}b^{3x}}{e}+k$

B. $\frac{1}{6Ina^2b^3}\frac{1}{a^{2x}b^{3x}}In\frac{1}{ea^{2x}b^{3x}}+k$

C. $\frac{1}{6Ina^2b^3}\frac{1}{a^{2x}b^{3x}}In\left(a^{2x}b^{3x}\right)+k$

D. - $\frac{1}{6Ina^2b^3}\frac{1}{a^{2x}b^{3x}}In\left(a^{2x}b^{3x}\right)+k$

Answer: B

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37. $\int \frac{3+2\cos x}{(2+3\cos x)^2} dx$ is equal to (a) $\left(\frac{\sin x}{3\cos x+2}\right)+c$ (b) $\left(\frac{2\cos x}{3\sin x+2}\right)+c$ (c) $\left(\frac{2\cos x}{3\cos x+2}\right)+c$ (d) $\left(\frac{2\sin x}{3\sin x+2}\right)+c$

A. $\left(\frac{\sin x}{3\cos x+2}\right)+c$

B. $\left(\frac{2\cos x}{3\sin x+2}\right)+c$

C. $\left(\frac{2\cos x}{3\cos x+2}\right)+c$

D. $\left(\frac{2\sin x}{3\sin x+2}\right)+c$

Answer: A

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38. If $\frac{d}{dx}f(x) = f'(x)$, then $\int \frac{xf'(x) - 2f(x)}{\sqrt{x^4 f(x)}}dx$ is equal to

A. $\frac{x^2}{f(x)} + c$

B. $|x|f'(x) + c$

C. $\frac{2\sqrt{f(x)}}{|x|} + c$

D. $|x|\sqrt{f(x)} + c$

Answer: C

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39. The value of the integral $\int \frac{(1 - \cos\theta)^{\frac{2}{7}}}{(1 + \cos\theta)^{\frac{9}{7}}}d\theta$ is

(a) $\frac{7}{11}\left(\tan\frac{\theta}{2}\right)^{\frac{11}{7}} + C$

(b) $\frac{7}{11}\left(\frac{\cos\theta}{2}\right)^{\frac{11}{7}} + C$

(c) $\frac{7}{11}\left(\frac{\sin\theta}{2}\right)^{\frac{11}{7}}+C$

(d) none of these

A. $\frac{7}{11}\left(\tan\frac{\theta}{2}\right)^{\frac{11}{7}}+C$

B. $\frac{7}{11}\left(\cos\frac{\theta}{2}\right)^{\frac{11}{7}}+C$

C. $\frac{7}{11}\left(\sin\frac{\theta}{2}\right)^{\frac{11}{7}}+C$

D. none of these

Answer: A

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40. If $\int\frac{dx}{\sqrt{\sin^3x\cos^5x}}=a\sqrt{\cot x}+b\sqrt{\tan^3x}+c,$ then

A. $a=-1, b=1/3$

B. $a=-3, b=2/3$

C. $a=-2, b=4/3$

D. $a = -2, b = 2/3$

Answer: D

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41. If $\int \frac{dx}{\cos^3 x\sqrt{\sin 2x}} = a\left(\tan^2 x + b\right)\sqrt{\tan x} + c$

A. $a = \frac{\sqrt{2}}{5}, b = \frac{1}{\sqrt{5}}$

B. $a = \frac{\sqrt{2}}{5}, b = 5$

C. $a = \frac{\sqrt{2}}{5}, b = -\frac{1}{\sqrt{5}}$

D. $a = \frac{\sqrt{2}}{5}, b = \sqrt{5}$

Answer: B

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42. If $\int \frac{dx}{(x+2)\left(x^2+1\right)} = a\log\left|1+x^2\right| + b\tan^{-1}x + \frac{1}{5}\log|x+2| + C$, then

A. $a = -\frac{1}{10}, b = -\frac{2}{5}$

B. $a = \frac{1}{10}, b = -\frac{2}{5}$

C. $a = -\frac{1}{10}, b = \frac{2}{5}$

D. $a = \frac{1}{10}, b = \frac{2}{5}$

Answer: C

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43. *If* $\int \frac{3e^x - 5e^{-x}}{4e^x + 5e^{-x}}dx = ax + b\ln\left(4e^x + 5e^{-x}\right) + C$, *then* (a) $a = -\frac{1}{8}, b = \frac{7}{8}$ (b) $a = \frac{1}{8}, b = \frac{7}{8}$ (c) $a = -\frac{1}{8}, b = -\frac{7}{8}$ (d) $a = \frac{1}{8}, b = -\frac{7}{8}$

A. $a = -\frac{1}{8}, b = \frac{7}{8}$

B. $a = \frac{1}{8}, b = \frac{7}{8}$

C. $a = -\frac{1}{8}, b = -\frac{7}{8}$

D. $a = \frac{1}{8}, b = -\frac{7}{8}$

Answer: A

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44. If $\int f(x)\sin x\cos x dx = \frac{1}{2\left(b^2 - a^2\right)}\ln f(x) + c$,then f(x) is equal to

A. $\frac{1}{a^2\sin^2 x + b^2\cos^2 x}$

B. $\frac{1}{a^2\sin^2 x - b^2\cos^2 x}$

C. $\frac{1}{a^2\cos^2 x + b^2\sin^2 x}$

D. $\frac{1}{a^2\cos^2 x - b^2\sin^2 x}$

Answer: A

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45. $\int \frac{x^9}{\left(4x^2+1\right)^6} dx$ is equal to

A. $\frac{1}{5x}\left(4+\frac{1}{x^2}\right)^{-5}+C$

B. $\frac{1}{5}\left(4+\frac{1}{x^2}\right)^{-5}+C$

C. $\frac{1}{10}\left(1+4x^2\right)^{-5}+C$

D. $\frac{1}{10}\left(4+\frac{1}{x^2}\right)^{-5}+C$

Answer: D

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46. If $\int \frac{1}{x\sqrt{1-x^3}} dx = a\log\left|\frac{\sqrt{1-x^3}-1}{\sqrt{1-x^3}+1}\right| + b$, then a is equal

A. 1/3

B. 2/3

C. $-1/3$

D. $-2/3$

Answer: A

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47. The value of the integral $\int\left(x^2+x\right)\left(x^{-8}+2x^{-9}\right)^{\frac{1}{10}}dx$ is $\frac{5}{11}\left(x^2+2x\right)^{\frac{11}{10}}+c$ (b) $\frac{5}{6}(x+1x)^{\frac{11}{10}}+c$ $\frac{6}{7}(x+1)^{\frac{11}{10}}+c$ (d) none of these

A. $\frac{5}{11}\left(x^2+2x\right)^{11/10}+c$

B. $\frac{5}{6}(x+1)^{11/10}+c$

C. $\frac{6}{7}(x+1)^{11/10}+c$

D. none of these

Answer: A

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48. $\int \frac{x^3 dx}{\sqrt{1+x^2}} isequa < o \quad \frac{1}{3}\sqrt{1+x^2}\left(2+x^2\right)+C \quad \frac{1}{3}\sqrt{1+x^2}\left(x^2-1\right)+C$

$\frac{1}{3}\left(1+x^2\right)^{\frac{3}{2}}+C$ (d) $\frac{1}{3}\sqrt{1+x^2}\left(x^2-2\right)+C$

A. $\frac{1}{3}\sqrt{1+x^2}\left(2+x^2\right)+C$

B. $\frac{1}{3}\sqrt{1+x^2}\left(x^2-1\right)+C$

C. $\frac{1}{3}\left(1+x^2\right)^{3/2}+C$

D. $\frac{1}{3}\sqrt{1+x^2}\left(x^2-2\right)+C$

Answer: D

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49. If $I=\int \frac{dx}{\left(a^2-b^2x^2\right)^{3/2}}$, then I equals

A. $\frac{x}{\sqrt{a^2-b^2x^2}}+C$

B. $\frac{x}{a^2\sqrt{a^2-b^2x^2}}+C$

C. $\frac{ax}{\sqrt{a^2 - b^2x^2}} + C$

D. none of these

Answer: B

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

A. $\sqrt{x^2 + \frac{1}{x^2} + 1} + C$

B. $\frac{\sqrt{x^4 + x^2 + 1}}{x^2} + C$

C. $\frac{\sqrt{x^4 + x^2 + 1}}{x} + C$

D. none of these

Answer: A

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

A. $-\frac{1}{3}\frac{\left(x^2+1\right)^{3/2}}{x^3}+C$

B. $x^3\left(x^2+1\right)^{-1/2}+C$

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

D. $-\frac{1}{3}\frac{\left(x^2+1\right)^{3/2}}{x^2}+C$

Answer: A

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52. $\int \frac{1+2x^6}{\left(1-x^6\right)^{3/2}} dx$ is equal to

A. $\frac{2x}{\sqrt{1+x^6}}+c$

B. $\frac{1}{\sqrt{\frac{1}{x^2} - x^4}} + c$

C. $\frac{x}{\sqrt{\frac{1}{x^2} - x^4}} + c$

D. $\frac{x^2 + x}{\sqrt{1 - x^6}} + C$

Answer: B

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53. The integral $\int \frac{2x^{12} + 5x^9}{\left[x^5 + x^3 + 1\right]^3} . dx$ is equal to-

A. $\frac{x^{10}}{2\left(1 + x^3 + x^5\right)^4} + c$

B. $\frac{x^2 + 2x}{\left(x^5 + x^3 + 1\right)^4} + c$

C. $\frac{x^{10}}{2\left(x^5 + x^3 + 1\right)^2} + c$

D. $\frac{2x^{10}}{\left(x^5+x^3+1\right)^3}+c$

Answer: C

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54. If $I_n=\int(\ln x)^n dx$ then I_n+nI_{n-1}

A. $\frac{(\text{In } x)^n}{x}+C$

B. $x(\text{In } x)^{n-1}+C$

C. $x(\text{In } x)^n+C$

D. none of these

Answer: C

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55. $\int e^x\{f(x)-f'(x)\}dx=\phi(x)$, then $\int e^x f(x)dx$ is

A. $\phi(x) = e^x f(x)$

B. $\phi(x) - e^x f(x)$

C. $\frac{1}{2}\left\{\phi(x) + e^x f(x)\right\}$

D. $\frac{1}{2}\left\{\phi(x) + e^x f'(x)\right\}$

Answer: C

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

A. $x\tan^{-1}x - In\left|\sec\left(\tan^{-1}x\right)\right| + c$

B. $x\tan^{-1}x + In\left|\sec\left(\tan^{-1}x\right)\right| + c$

C. $x\tan^{-1}x - In\left|\cos\left(\tan^{-1}x\right)\right| + c$

D. none of these

Answer: D

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57. If $\int x\left(\frac{\ln\left(x+\sqrt{1+x^2}\right)}{\sqrt{1+x^2}}\right)dx = a\sqrt{1+x^2}\ln\left(x+\sqrt{1+x^2}\right)+bx+c$ then

A. $a=1, b=-1$

B. $a=1, b=1$

C. $a=-1, b=1$

D. $a=-1, b=-1$

Answer: A

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

A. $f(x)=\frac{1}{2}x^2$

B. $g(x) = \log x$

C. $A = 1$

D. none of these

Answer: D

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59. If $I = \int e^{-x} \log\left(e^x + 1\right) dx$, $then Iequal$ $a + \left(e^{-x} + 1\right)\log\left(e^x + 1\right) + C$ $a + \left(e^x + 1\right)\log\left(e^x + 1\right) + C$ $a - \left(e^{-x} + 1\right)\log\left(e^x + 1\right) + C$ none of these

A. $x + \left(e^{-x} + 1\right)\log\left(e^x + 1\right) + C$

B. $x + \left(e^x + 1\right)\log\left(e^x + 1\right) + C$

C. $x - \left(e^{-x} + 1\right)\log\left(e^x + 1\right) + C$

D. none of these

Answer: C

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60. If $\int xe^x \cos x dx = ae^x(b(1-x)\sin x + cx\cos x) + d$, then

A. $a = 1, b = 1, c = -1$

B. $a = \frac{1}{2}, b = -1, c = 1$

C. $a = 1, b = -1, c = 1$

D. $a = \frac{1}{2}, b = 1, c = -1$

Answer: B

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61. $\int x \sin x \sec^3 x dx$ is equal to

A. $\frac{1}{2}\left[\sec^2 x - \tan x\right] + c$

B. $\frac{1}{2}\left[x\sec^2 x - \tan x\right] + c$

C. $\frac{1}{2}\left[x\sec^2 x + \tan x\right] + c$

D. $\frac{1}{2}\left[\sec^2 x + \tan x\right] + c$

Answer: B

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62. $\int e^{\tan^{-1}x}\left(1+x+x^2\right)d\left(\cot^{-1}x\right)$ is equal to (a) $-e^{\tan^{-1}x}+c$ (b) $e^{\tan^{-1}x}+c$ (c) $-xe^{\tan^{-1}x}+c$ (d) $xe^{\tan^{-1}x}+c$

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

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

C. $-xe^{\tan^{-1}x}+c$

D. $xe^{\tan^{-1}x}+c$

Answer: C

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63. $\int e^x\left(\frac{2\tan x}{1+\tan x}+\cot^2\left(x+\frac{\pi}{4}\right)\right)dx$ is equal to

A. $e^x \tan\left(\frac{\pi}{4} - x\right) + c$

B. $e^x \tan\left(x - \frac{\pi}{4}\right) + c$

C. $e^x \tan\left(\frac{3\pi}{4} - x\right) + c$

D. none of these

Answer: B

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64. $\int e^{x^4}\left(x + x^3 + 2x^5\right)e^{x^2}dx$ is equal to

A. $\frac{1}{2}xe^{x^2}e^{x^4} + c$

B. $\frac{1}{2}x^2e^{x^4} + c$

C. $\frac{1}{2}e^{x^2}e^{x^4} + c$

D. $\frac{1}{2}x^2e^{x^2}e^{x^4} + c$

Answer: D

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65. The value of integral $\int e^x\left(\frac{1}{\sqrt{1+x^2}}+\frac{1}{\sqrt{\left(1+x^2\right)^5}}\right)dxisequa<o$

$e^x\left(\frac{1}{\sqrt{1+x^2}}+\frac{1}{\sqrt{\left(1+x^2\right)^3}}\right)+c$

$e^x\left(\frac{1}{\sqrt{1+x^2}}-\frac{1}{\sqrt{\left(1+x^2\right)^3}}\right)+c$

$e^x\left(\frac{1}{\sqrt{1+x^2}}+\frac{1}{\sqrt{\left(1+x^2\right)^5}}\right)+c$ none of these

A. $e^x\left(\frac{1}{\sqrt{1+x^2}}+\frac{x}{\sqrt{\left(1+x^2\right)^3}}\right)+c$

B. $e^x\left(\frac{1}{\sqrt{1+x^2}}-\frac{x}{\sqrt{\left(1+x^2\right)^3}}\right)+c$

C. $e^x\left(\frac{1}{\sqrt{1+x^2}}+\frac{x}{\sqrt{\left(1+x^2\right)^5}}\right)+c$

D. none of these

Answer: A

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

A. $\left(\frac{x-1}{x+1}\right) e^x + c$

B. $e^x \left(\frac{x+1}{x-1}\right) + c$

C. $e^x (x+1)(x-1) + c$

D. none of these

Answer: A

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67. $\int \left(\frac{x+2}{x+4}\right)^2 e^x dx$ is equal to

A. $e^x\left(\frac{x}{x+4}\right)+c$

B. $e^x\left(\frac{x+2}{x+4}\right)+c$

C. $e^x\left(\frac{x-2}{x+4}\right)+c$

D. $\left(\frac{2xe^2}{x+4}\right)+c$

Answer: A

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68. $\int e^{\tan x}(\sec x - \sin x)dx$ is equal to

A. $e^{\tan x}\cos x + C$

B. $e^{\tan x}\sin x + C$

C. $-e^{\tan x}\cos x + C$

D. $e^{\tan x}\sec x + C$

Answer: C

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69. $\int \frac{\cos ec^2 x - 2005}{\cos^{2005} x} . dx$

A. $\frac{\cot x}{(\cos x)^{2005}} + c$

B. $\frac{\tan x}{(\cos x)^{2005}} + c$

C. $\frac{-(\tan x)}{(\cos x)^{2005}} + c$

D. none of these

Answer: D

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70. $\int \left(1 + 2x^2 + \frac{1}{x}\right) e^{x^2 - \frac{1}{x}} dx$ is equal to (a) $-xe^{x^2 - \frac{1}{x}} + c$ (b) $xe^{x^2 - \frac{1}{x}} + c$ (c) $(2x - 1)e^{x^2 - \frac{1}{x}} + c$ (d) $(2x + 1)e^{x^2 - \frac{1}{x}} + c$

A. $-xe^{x^2 - \frac{1}{x}} + c$

B. $xe^{x^2 - \frac{1}{x}} + c$

C. $(2x - 1)e^{x^2 - \frac{1}{x}} + c$

D. $(2x + 1)e^{x^2 - \frac{1}{x}} + c$

Answer: B

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71. $\int e^{\sin^{-1}x}\left(\frac{\log_e x}{\sqrt{1 - x^2}} + \frac{1}{x}\right)dx$ is equal to

A. $\log_e x \cdot e^{\sin^{-1}x} + c$

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

C. $-\log_e x \cdot e^{\sin^{-1}x} + c$

D. $e^{\sin^{-1}x}\left(\log_e x + \frac{1}{x}\right) + c$

Answer: A

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72. $If xf(x) = 3f^2(x) + 2, then \int \frac{2x^2 - 12xf(x) + f(x)}{(6f(x) - x)\left(x^2 - f(x)\right)^2} dx$ equal. $\frac{1}{x^2 - f(x)} + c$ (b) $\frac{1}{x^2 + f(x)} + c$ $\frac{1}{x - f(x)} + c$ (d) $\frac{1}{x + f(x)} + c$

A. $\frac{1}{x^2 - f(x)} + c$

B. $\frac{1}{x^2 + f(x)} + c$

C. $\frac{1}{x - f(x)} + c$

D. $\frac{1}{x + f(x)} + c$

Answer: A

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73. The value of $\int \frac{\left(ax^2 - b\right)dx}{x\sqrt{c^2x^2 - \left(ax^2 + b\right)^2}}$ is equal to

A. $\frac{1}{c}\sin^{-1}\left(ax + \frac{b}{x}\right) + k$

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

C. $\sin^{-1}\left(\frac{ax+\frac{b}{x}}{c}\right)+k$

D. none of these

Answer: C

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74. The value of $\int \frac{dx}{\left(1+\sqrt{x}\right)\left(\sqrt{x-x^2}\right)}$ is equal to

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

B. $\frac{1+\sqrt{x}}{(1+x)^2}+c$

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

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

Answer: D

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

A. $\frac{1}{2}\ln\left|\frac{2+\sin x-\cos x}{2-\sin x+\cos x}\right| - \frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right)+c$

B. $\frac{1}{2}\ln\left|\frac{2+\sin x-\cos x}{2-\sin x+\cos x}\right| - \frac{1}{2\sqrt{2}}\tan^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right)+c$

C. $\frac{1}{4}\ln\left|\frac{2+\sin x-\cos x}{2-\sin x+\cos x}\right| - \frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{\sin x+\cos x}{\sqrt{2}}\right)+c$

D. none of these

Answer: C

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76. $4\int \frac{\sqrt{a^6+x^8}}{x} dx is equal \rightarrow$ (a) $\sqrt{a^6+x^8}+\frac{a^3}{2}\ln\left|\frac{\sqrt{a^6+x^8}+a^3}{\sqrt{a^6+x^8}-a^3}\right|+c$ (b) $a^6\ln\left|\frac{\sqrt{a^6+x^8}-a^3}{\sqrt{a^6+x^8}+a^3}\right|+c$ (c) $\sqrt{a^6+x^8}+\frac{a^3}{2}\ln\left|\frac{\sqrt{a^6+x^8}-a^3}{\sqrt{a^6+x^8}+a^3}\right|+c$ (d) $a^6\ln\left|\frac{\sqrt{a^6+x^8}+a^3}{\sqrt{a^6+x^8}-a^3}\right|+c$

A. $\sqrt{a^6+x^8}+\frac{a^3}{2}In\left|\frac{\sqrt{a^6+x^8}+a^3}{\sqrt{a^6+x^8}-a^3}\right|+c$

B. $a^6In\left|\frac{\sqrt{a^6+x^8}-a^3}{\sqrt{a^6+x^8}+a^3}\right|+c$

C. $\sqrt{a^6+x^8}+\frac{a^3}{2}In\left|\frac{\sqrt{a^6+x^8}-a^3}{\sqrt{a^6+x^8}+a^3}\right|+c$

D. $a^6In\left|\frac{\sqrt{a^6+x^8}+a^3}{\sqrt{a^6+x^8}-a^3}\right|+c$

Answer: C

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77. $IfI_{m,n} = \int \cos^m x \sin nx dx, then 7I_{4,3} - 4I_{3,2} isequa < o$ constant (b) $-\cos^2 x + C$ $-\cos^4 x \cos 3x + C$ (d) $\cos 7x - \cos 4x + C$

A. constant

B. $-\cos^2 x + C$

C. $-\cos^4 x \cos 3x + C$

D. $\cos 7x - \cos 4x + C$

Answer: C

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Exercises Multiple Correct Answers Type

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

A. $2\sec^{-1}\sqrt{2e^x} + c$

B. $-2\tan^{-1}\frac{1}{\sqrt{2e^x - 1}} + c$

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

D. $2\tan^{-1}\sqrt{2e^{x}-1}+c$

Answer: A::B::D

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2. If $\int \sin x d(\sec x) = f(x) - g(x) + c$, then

A. $f(x) = \sec x$

B. $f(x) = \tan x$

C. $g(x) = 2x$

D. $g(x) = x$

Answer: B::D

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3. $\int\sqrt{1+\cos ecx}dx equals \quad 2\sin^{-1}\sqrt{\sin x}+c \quad$ (b) $\quad \sqrt{2}\cos^{-1}\sqrt{\cos x}+c$

$c-2\sin^{-1}(1-2\sin x)\ \cos^{-1}(1-2\sin x)+c$

A. $2\sin^{-1}\sqrt{\sin x}+c$

B. $\sqrt{2}\cos^{-1}\sqrt{\cos x}+c$

C. $c-2\sin^{-1}(1-2\sin x)$

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

Answer: A::D

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4. If $I=\int\sec^2 x\cos ec^4 x dx=A\cot^3 x+B\tan x+C\cot x+D,$ then $A=-\frac{1}{3}$ (b) $B=2\ C=-2$ (d) none of these

A. $A=-\frac{1}{3}$

B. $B=2$

C. $C=-2$

D. none of these

Answer: A::C

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5. A curve $g(x) = \int x^{27}\left(1 + x + x^2\right)^6\left(6x^2 + 5x + 4\right)dx$ is passing through origin. Then

(a)$g(1) = \frac{3^7}{7}$ (b) $g(1) = \frac{2^7}{7}$ $g(-1) = \frac{1}{7}$ (d) $g(-1) = \frac{3^7}{14}$

A. $g(1) = \frac{3^7}{7}$

B. $g(1) = \frac{2^7}{7}$

C. $g(-1) = \frac{1}{7}$

D. $g(-1) = \frac{3^7}{14}$

Answer: A::C

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6. 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

A. $k = -2, f(x) = \cot^{-1}x, g(x) = \sqrt{\text{cosec}x - 1}$

B. $k = -2, f(x) = \tan^{-1}x, g(x) = \sqrt{\text{cosec}x - 1}$

C. $k = 2, f(x) = \tan^{-1}x, g(x) = \frac{\cot x}{\sqrt{\text{cosec}x - 1}}$

D. $k = 2, f(x) = \cot^{-1}x, g(x) = \frac{\cot x}{\sqrt{\text{cosec}x + 1}}$

Answer: B::D

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7. If $I = \int \frac{\sin x + \sin^3 x}{\cos 2x} dx = P\cos x + Q\log|f(x)| + R$, then $P = \frac{1}{2}, Q = -\frac{3}{4\sqrt{2}}$

(b) $P = \frac{1}{4}, Q = \frac{1}{\sqrt{2}}$ $f(x) = \frac{\sqrt{2}\cos x + 1}{\sqrt{2}\cos x - 1}$ (d) $f(x) = \frac{\sqrt{2}\cos x - 1}{\sqrt{2}\cos x + 1}$

A. $P = 1/2, Q = -\frac{3}{4\sqrt{2}}$

B. $P = 1/4, Q = -\frac{1}{\sqrt{2}}$

C. $f(x) = \frac{\sqrt{2}\cos x + 1}{\sqrt{2}\cos x - 1}$

D. $f(x) = \frac{\sqrt{2}\cos x - 1}{\sqrt{2}\cos x + 1}$

Answer: A::C

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8. If $\int \frac{e^{x-1}}{\left(x^2 - 5x + 4\right)} 2x dx = AF(x - 1) + BF(x - 4) + C$ and $F(x) = \int \frac{e^x}{x} dx$, *then*

A. $A = -2/3$

B. $B = (4/3)e^3$

C. $A = 2/3$

D. $B = (8/3)e^3$

Answer: A::D

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9. If $\int x^2 e^{-2x} = e^{-2x}\left(ax^2 + bx + c\right) + d$ then

A. $a = -\frac{1}{2}$

B. $b = \frac{1}{2}$

C. $c = -\frac{1}{4}$

D. $d \in R$

Answer: A::C::D

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

A. both $f(x)$ and $g(x)$ are odd functions

B. $f(x)$ is one-one function

C. $f(x) = g(x)$ has no real roots

D. $\int \frac{f(x)}{g(x)} dx = \frac{1}{x} + \frac{3}{x^3} + c$

Answer: A::C::D

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11. If $\int \frac{x^2 - x + 1}{\left(x^2 + 1\right)^{\frac{3}{2}}} e^x dx = e^x f(x) + c$, then (a) $f(x)$ is an even function (b) $f(x)$ is a bounded function (c) the range of $f(x)$ is $(0, 1)$ (d) $f(x)$ has two points of extrema

A. $f(x)$ is an even function

B. $f(x)$ is a bounded function

C. the range of $f(x)$ is $(0, 1]$

D. $f(x)$ has two points of extrema

Answer: A::B::C

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12. If $\int \frac{\cos 4x + 1}{\cot x - \tan x} dx = Af(x) + B$, then

A. $A = -\frac{1}{8}$

B. $B = \frac{1}{2}$

C. $f(x)$ has fundamental period $\frac{\pi}{2}$

D. $f(x)$ is an odd function

Answer: A::C

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13. If $\int \sin^{-1} x \cos^{-1} x dx = f^{-1}(x) \left[\frac{\pi}{2}x - xf^{-1}(x) - 2\sqrt{1 - x^2}\right] + 2x + C$, *then*

$f(x) = \sin x$ (b) $f(x) = \cos x$ $A = \frac{\pi}{4}$ (d) $A = \frac{\pi}{2}$

A. $f(x) = \sin x$

B. $f(x) = \cos x$

C. $A = \frac{\pi}{4}$

D. $A = \frac{\pi}{2}$

Answer: A::D

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14. If $f(x) = \int \frac{x^8 + 4}{x^4 - 2x^2 + 2} dx and f(0) = 0, then\ f(x)$ is an odd function $f(x)$ has range R $f(x)$ has at least one real root $f(x)$ is a monotonic function.

A. $f(x)$ is an odd function

B. $f(x)$ has range R

C. $f(x)$ has at least one real root

D. $f(x)$ is a monotonic function

Answer: A::B::C::D

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15. If $\int \frac{dx}{x^2 + ax + 1} = f(g(x)) + c,$ then

A. $f(x)$ is inverse trigonometric function for $|a| < 2$

B. $f(x)$ is logarithmic function for $|a| > 2$

C. $g(x)$ is quadratic function for $|a| < 2$

D. $g(x)$ is rational function for $|a| > 2$

Answer: A::B::D

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16. If $\int \frac{1 - x^7}{x\left(1 + x^7\right)} dx = a\log_e|x| + b\log_e\left|x^7 + 1\right| + c,$ then

A. $a = 1$

B. $a = -1$

C. $b = \frac{2}{7}$

D. $b = -\frac{2}{7}$

Answer: A::D

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17. If $\int \frac{3\sin x + 2\cos x}{3\cos x + 2\sin x} dx = ax + b\log_e|2\sin x + 3\cos x| + c$ then a. $a = -\frac{12}{13}$ b. $b = \frac{6}{13}$ c. $a = \frac{12}{13}$ d. $b = -\frac{15}{39}$

A. $a = -\frac{12}{13}$

B. $b = \frac{6}{13}$

C. $a = \frac{12}{13}$

D. $b = -\frac{15}{39}$

Answer: C::D

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Exercises Linked Comprehension Type

1. $y = f(x)$ is a polynomial function passing through point $(0, 1)$ and which increases in the intervals $(1, 2)$ and $(3, \infty)$ and decreases in the intervals $(\infty, 1)$ and $(2, 3)$.

If $f(1) = -8$, then the value of $f(2)$ is

A. -3

B. -6

C. -20

D. -7

Answer: D

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2. $y = f(x)$ is a polynomial function passing through point $(0, 1)$ and which increases in the intervals $(1, 2)$ and $(3, \infty)$ and decreases in the intervals $(-\infty, 1)$ and $(2, 3)$.

If $f(1) = -8$, then the range of $f(x)$ is (a) $[3, \infty)$ (b) $[-8, \infty)$ (c) $[-7, \infty)$ (d) $(-\infty, 6]$

A. $[3, \infty)$

B. $[-8, \infty)$

C. $[-7, \infty)$

D. $(-\infty, 6]$

Answer: B

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3. $y = f(x)$ is a polynomial function passing through point $(0, 1)$ and which increases in the intervals $(1, 2)$ and $(3, \infty)$ and decreases in the intervals $(\infty, 1)$ and $(2, 3)$.

If $f(x) = 0$ has four real roots, then the range of values of leading coefficient of polynomial is

A. [4/9, 1/2]

B. [4/9, 1]

C. [1/3, 1/2]

D. none of these

Answer: A

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4. If A is square matrix and e^A is defined as

$$e^A = I + A + \frac{A^2}{2!} + \frac{A^3}{3!} + \ldots = \frac{1}{2}\begin{bmatrix} f(x) & g(x) \\ g(x) & f(x) \end{bmatrix}, \text{ where}$$

$$A = \begin{bmatrix} x & x \\ x & x \end{bmatrix} \text{ and } 0 < x < 1, I \text{ is an identity matrix.}$$

$\int (g(x) + 1)\sin x dx$ is equal to

A. $\log\left(e^x + e^{-x}\right) + c$

B. $\log\left|e^x - e^{-x}\right| + c$

C. $\log\left|e^{2x} - 1\right| + c$

D. none of these

Answer: A

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5. If A is a square matrix and e^a is defined as $e^A = 1 + \frac{A^2}{2!} + \frac{A^3}{3!} \ldots\ldots\ldots \infty = \frac{1}{2}[f(x), g(x) \text{ and } g(x), f(x)]$, where $A = \begin{bmatrix} x & x \\ x & x \end{bmatrix}$. and I being the identity matrix then $\int \frac{g(x)}{f(x)} dx =$

A. $\frac{e^x}{2}(\sin x - \cos x)$

B. $\frac{e^{2x}}{5}(2\sin x - \cos x)$

C. $\frac{e^x}{5}(\sin 2x - \cos 2x)$

D. none of these

Answer: B

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6. If A is square matrix and e^A is defined as

$$e^A = I + A + \frac{A^2}{2!} + \frac{A^3}{3!} + \ldots = \frac{1}{2}\begin{bmatrix} f(x) & g(x) \\ g(x) & f(x) \end{bmatrix}, \text{ where}$$

$$A = \begin{bmatrix} x & x \\ x & x \end{bmatrix} \text{ and } 0 < x < 1, I \text{ is an identity matrix.}$$

$\int (g(x) + 1)\sin x dx$ is equal to

A. $\frac{1}{2\sqrt{e^x - 1}} - \text{cosec}^{-1}\left(e^x\right) + c$

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

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

D. none of these

Answer: C

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7. Euler's substitution:

Integrals of the form $\int R\left(x, \sqrt{ax^2 + bx + c}\right)dx$ are claculated with the aid

of one of the following three Euler substitutions:

i. $\sqrt{ax^2 + bx + c} = t \pm x\sqrt{a}$ if $a > 0$

ii. $\sqrt{ax^2 + bx + c} = tx \pm x\sqrt{c}$ if $c > 0$

iii. $\sqrt{ax^2 + bx + c} = (x - a)t$ if $ax^2 + bx + c = a(x - a)(x - b)$ i.e., if α is real root of $ax^2 + bx + c = 0$

$\frac{xdx}{\sqrt{7x - 10 - x^2}^3}$ can be evaluated by substituting for x as

A. $\log_e|t + 1|$

B. $\log_e|t + 2|$

C. $\frac{1}{t + 2}$

D. none of these

Answer: D

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8. Euler's substitution:

Integrals of the form $\int R\left(x, \sqrt{ax^2 + bx + c}\right)dx$ are claculated with the aid

of one of the following three Euler substitutions:

i. $\sqrt{ax^2 + bx + c} = t \pm x\sqrt{a}$ if $a > 0$

ii. $\sqrt{ax^2 + bx + c} = tx \pm x\sqrt{c}$ if $c > 0$

iii. $\sqrt{ax^2 + bx + c} = (x - a)t$ if $ax^2 + bx + c = a(x - a)(x - b)$ i.e., if α is real root of $ax^2 + bx + c = 0$

$\frac{xdx}{\sqrt{7x - 10 - x^2}^3}$ can be evaluated by substituting for x as

A. x=(5+ 2 t^2)/(t^2 +1)

B. x=(5 - t^2)/(t^2 +2)

C. x=(2 t^2 - 5)/(3t^2 -1)

D. none of these

Answer: B

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9. Euler's substitution:

Integrals of the form $\int R\left(x, \sqrt{ax^2 + bx + c}\right)dx$ are claculated with the aid

of one of the following three Euler substitutions:

i. $\sqrt{ax^2 + bx + c} = t \pm x\sqrt{a}$ if $a > 0$

ii. $\sqrt{ax^2 + bx + c} = tx \pm x\sqrt{c}$ if $c > 0$

iii. $\sqrt{ax^2 + bx + c} = (x - a)t$ if $ax^2 + bx + c = a(x - a)(x - b)$ i.e., if α is real root of $ax^2 + bx + c = 0$

$\frac{xdx}{\sqrt{7x - 10 - x^2}^3}$ can be evaluated by substituting for x as

A. $x = \frac{5 + 2t^2}{t^2 + 1}$

B. $x = \frac{5 - t^2}{t^2 + 2}$

C. $x = \frac{2t^2 - 5}{3t^2 - 1}$

D. none of these

Answer: A

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10. Let $f(x) = \int \frac{x^2 dx}{\left(1+x^2\right)\left(1+\sqrt{1+x^2}\right)}$ and $f(0) = 0$.

$f(x)$ is

A. $\log\left(1+\sqrt{2}\right)$

B. $\log\left(1+\sqrt{2}\right) - \frac{\pi}{4}$

C. $\log\left(1+\sqrt{2}\right) + \frac{\pi}{4}$

D. none of these

Answer: B

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11. Let $f(x) = \int \frac{x^2}{\left(1+x^2\right)\left(1+\sqrt{1+x^2}\right)} dx$ and $f(0) = 0$ then $f(1)$ is

A. an increasing function

B. a decreasing function

C. a non-monotonic function

D. can't say anything

Answer: A

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12. If $\int \frac{x(x-1)}{\left(x^2+1\right)(x+1)\sqrt{x^3+x^2+x}}dx$

$= \frac{1}{2}\log_e\left|\frac{\sqrt{f(x)}-1}{\sqrt{f(x)}+1}\right| - \tan^{-1}\sqrt{f(x)} + C,$ then

The value of $f(1)$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

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13. If $\int \frac{x(x-1)}{\left(x^2+1\right)(x+1)\sqrt{x^3+x^2+x}}dx$

$= \frac{1}{2}\log_e\left|\frac{\sqrt{f(x)}-1}{\sqrt{f(x)}+1}\right| - \tan^{-1}\sqrt{f(x)} + C,$ then

The value of $\lim_{x \to \infty} \tan^{-1}\sqrt{f(x)}$ is

A. $\pi/2$

B. $\pi/4$

C. π

D. 2π

Answer: A

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14. If a function satisfies the relation

$f(x)f''(x) - f(x)f'(x) = (f'(x))^2 \forall x \in R$ and $f(0) = f'(0) = 1,$ then

The value of $\lim_{x \to -\infty} f(x)$ is

A. $\frac{1}{\sqrt{e}}$

B. $\frac{1}{e}$

C. $\sqrt{e}$

D. e

Answer: B

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15. If a function satisfies the relation $f(x)f''(x) - f(x)f'(x) = (f'(x))^2 \forall x \in R$ and $f(0) = f'(0) = 1$, then

Number of roots of the equation $f(x) = e^x$ is

A. 0

B. 1

C. 2

D. infinite

Answer: B

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16. Consider two differentiable functions $f(x), g(x)$ satisfying

$6\int f(x)g(x)dx = x^6 + 3x^4 + 3x^2 + c$ and $2\int \frac{g(x)dx}{f(x)} = x^2 + c$, where $f(x) > 0 \forall x \in$

$\int (g(x) - f(x))dx$ is equal to

A. $\frac{x^4}{4} - \frac{x^2}{2} + x + c$

B. $\frac{x^4}{4} + \frac{x^2}{2} - \frac{x^3}{3} + x + c$

C. $\frac{x^4}{4} - \frac{x^3}{3} + \frac{x^2}{2} - x + c$

D. $\frac{x^4}{4} + \frac{x^3}{3} + c$

Answer: B

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17. Consider two differentiable functions $f(x)$, $g(x)$ satisfying

$6\int f(x)g(x)dx = x^6 + 3x^4 + 3x^2 + c$ and $2\int \frac{g(x)dx}{f(x)} = x^2 + c$, where $f(x) > 0 \forall x \in$

$\lim_{x \to 0} \frac{\log(f(x))}{g(x)} =$

A. e

B. 2

C. 1

D. 0

Answer: D

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Exercises Matrix Match Type

1. Match the following lists:

List I	List II
a. If $\int \frac{2^x}{\sqrt{1-4^x}}dx = k\sin^{-1}(f(x))+C$, then k is greater than	p. 0
b. If $\int \frac{(\sqrt{x})^5}{(\sqrt{x})^7+x^6}dx = a\ln\frac{x^k}{x^k+1}+c$, then ak is less than	q. 1
c. If $\int \frac{x^4+1}{x(x^2+1)^2}dx = k\ln\lvert x\rvert + \frac{m}{1+x^2}+n$, where n is the constant of integration, then mk is greater than	r. 3
d. If $\int \frac{dx}{5+4\cos x} = k\tan^{-1}\left(m\tan\frac{x}{2}\right)+C$, then k/m is greater than	s. 4

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2. Match the following lists:

List I	List II
a. $\int \frac{e^{2x}-1}{e^{2x}+1}\,dx$ is equal to	p. $x - \log\left[1+\sqrt{1-e^{2x}}\right]+c$
b. $\int \frac{1}{(e^x+e^{-x})^2}\,dx$ is equal to	q. $\log(e^x+1)-x-e^{-x}+c$
c. $\int \frac{e^{-x}}{1+e^x}\,dx$ is equal to	r. $\log(e^{2x}+1)-x+c$
d. $\int \frac{1}{\sqrt{1-e^{2x}}}\,dx$ is equal to	s. $-\frac{1}{2(e^{2x}+1)}+c$

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3. Match the following lists:

List I	List II
a. If $f(x)$ is an integrable function for $x \in \left[\frac{\pi}{6}, \frac{\pi}{3}\right]$ and $I_1 = \int_{\pi/6}^{\pi/3} \sec^2\theta f(2\sin 2\theta)\, d\theta$, and $I_2 = \int_{\pi/6}^{\pi/3} \text{cosec}^2\theta f(2\sin 2\theta) d\theta$, then $I_1/I_2 =$	**p.** 3
b. If $f(x+1) = f(3+x)\ \forall\ x$, and the value of $\int_a^{a+b} f(x)dx$ is independent of a, then the value of b can be	**q.** 1
c. The value of $2\int_1^4 \frac{\tan^{-1}[x^2]}{\tan^{-1}[x^2] + \tan^{-1}[25 + x^2 - 10x]} dx$ (where [.]denotes the greatest integer function) is	**r.** 2
d. If $I = \int_0^2 \sqrt{x + \sqrt{x + \sqrt{x + \cdots \infty}}}\ dx$ (where $x > 0$), then [I] is equal to (where [.] denotes the greatest integer function)	**s.** 4

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4. Consider

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

$$= \left(ax^2 + bx + c\right)\sqrt{x^2 + x + 1} + \lambda \int \frac{dx}{\sqrt{x^2 + x + 1}}$$

Now, match the following lists and then choose the correct code.

List I	List II
a. The value of a	p. $-\frac{7}{24}$
b. The value of b	q. $\frac{1}{3}$
c. The value of c	r. $\frac{1}{16}$
d. The value of λ	s. $\frac{13}{12}$

Codes:

	a	b	c	d
(1)	q	p	s	r
(2)	s	p	q	r
(3)	r	q	p	s
(4)	q	s	p	r

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Exercises Numerical Value Type

1.

Let $f(x) = \int x^{\sin x}(1 + x\cos x \cdot Inx + \sin x)dx$ and $f\left(\frac{\pi}{2}\right) = \frac{\pi^2}{4}$. Then the value of co

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2. Let $g(x) = \int \frac{1 + 2\cos x}{(\cos x + 2)^2} dx and g(0) = 0.$ then the value of $8g\left(\frac{\pi}{2}\right)$ is

_____

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3.

Let $k(x) = \int \frac{\left(x^2 + 1\right)dx}{\sqrt[3]{x^3 + 3x + 6}}$ and $k(-1) = \frac{1}{\sqrt[3]{2}}$. Then the value of $k(-2)$ is -.

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4. If the value $\int \frac{1-(\cot x)^{2008}}{\tan x+(\cot x)^{2009}}dx=\frac{1}{k}\ln\left|\sin^k x+\cos^k x\right|+c$,then find k.

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5. If $f(x)=\int \frac{3x^2+1}{\left(x^2-1\right)^3}dx and f(0)=0,$ then the value of $\left|\frac{2}{f(2)}\right|$ is___

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6. If $f(x)=\sqrt{x}, g(x)=e^x-1,$ and $\int fog(x)dx=Afog(x)+B\tan^{-1}(fog(x))+C,$

then $A+B$ is equal to .

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7.

If $\int \frac{2\cos x-\sin x+\lambda}{\cos x+\sin x-2}dx=A\ \text{In}|\cos x+\sin x-2|+Bx+C,$ then the value of $A+B+$

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8.

If $\int e^{x^3+x^2-1}\left(3x^4+2x^3+2x\right)dx = f(x)+C$, then the value of $f(1)\times f(-1)$ is - .

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9. If $f(x) = \int \frac{dx}{x^{1/3}+2}$ and $f(0) = 12\log_e 2$, then the value of $f(-1)$ is - .

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10.

If $I = \frac{\int dx}{\sqrt[3]{\sin^{11}x\cos x}} = -A(\tan x)^{-\frac{8}{3}} + B(\tan x)^{-\frac{2}{3}} + c$, then the value of $4A+B$ is

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Archives Jee Main Single Correct Answer Type

1. If $\int \frac{5\tan x}{\tan x - 2} dx = x + a \ \ln(\sin x - 2\cos x) + k$ then $a =$

A. -1

B. -2

C. 1

D. 2

Answer: D

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2. If $\int f(x)dx = \psi(x)$, then $\int x^5 f\left(x^3\right)dx$

A. $\frac{1}{3}\left[x^3\Psi\left(x^3\right) - \int x^2\Psi\left(x^3\right)dx\right] + c$

B. $\frac{1}{3}x^3\Psi\left(x^3\right) - 3\int x^3\Psi\left(x^3\right)dx + c$

C. $\frac{1}{3}x^3\Psi\left(x^3\right) - \int x^2\Psi\left(x^3\right)dx + c$

D. $\frac{1}{3}\left[x^3\Psi\left(x^3\right) - \int x^3\Psi\left(x^3\right)dx\right] + c$

Answer: C

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3. The integral $\int\left(1+x-\frac{1}{x}\right)e^{x+\frac{1}{x}}dx$ is equal to

A. $(x-1)e^{x+\frac{1}{x}}+c$

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

C. $(x+1)e^{x+\frac{1}{x}}+c$

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

Answer: B

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4. The integral $\int\frac{dx}{x^2\left(x^4+1\right)^{3/4}}$ equals

A. $\left(\frac{x^4+1}{x^4}\right)^{1/4}+c$

B. $\left(x^4+1\right)^{1/4}+c$

C. $-\left(x^4+1\right)^{1/4}+c$

D. $-\left(\frac{x^4+1}{x^4}\right)^{1/4}+c$

Answer: D

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5. The integral $\int \frac{2x^{12}+5x^9}{\left[x^5+x^3+1\right]^3}.dx$ is equal to-

(A) $\frac{x^{10}}{2\left(x^5+x^3+1\right)^2}$

(B) $\frac{x^5}{2\left(x^5+x^3+1\right)^2}$

(C) $-\frac{x^{10}}{2\left(x^5+x^3+1\right)^2}$

(D) $-\frac{x^5}{2\left(x^5+x^3+1\right)^2}$

A. $\frac{x^{10}}{2\left(x^5+x^3+1\right)^2}+C$

B. $\frac{x^5}{2\left(x^5+x^3+1\right)^2}+C$

C. $\frac{-x^{10}}{2\left(x^5+x^3+1\right)^2}$

D. $\frac{-x^5}{\left(x^5+x^3+1\right)^2}+C$

Answer: A

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6. Let $I_n=\int \tan^n x dx, (n>1)$. If $I_4+I_6=a\tan^5 x+bx^5+C$, Where C is a constant of integration, then the ordered pair (a, b) is equal to :

A. $\left(-\frac{1}{5}, 0\right)$

B. $\left(-\frac{1}{5}, 1\right)$

C. $\left(\frac{1}{5}, 0\right)$

D. $\left(\frac{1}{5}, -1\right)$

Answer: C

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7. Evaluate: $\int \frac{\sin^2 x \cos^2 x}{\left(\sin^5 x + \cos^3 x \sin^2 x + \sin^3 x \cos^2 x + \cos^5 x\right)^2} dx$

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

B. $\frac{1}{3\left(1 + \tan^3 x\right)} + C$

C. $\frac{-1}{3\left(1 + \tan^3 x\right)} + C$

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

Answer: C

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Archives Jee Advanced Single Correct Answer Type

1. The integral $\int \frac{\sec^2 x}{(\sec x + \tan x)^{\frac{9}{2}}} dx$ equals (for some arbitrary constant K).

$$-\frac{1}{(\sec x + \tan x)^{\frac{11}{2}}}\left\{\frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2\right\} + K$$

$$\frac{1}{(\sec x + \tan x)^{\frac{1}{11}}}\left\{\frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2\right\} + K$$

$$-\frac{1}{(\sec x + \tan x)^{\frac{11}{2}}}\left\{\frac{1}{11} + \frac{1}{7}(\sec x + \tan x)^2\right\} + K$$

$$\frac{1}{(\sec x + \tan x)^{\frac{11}{2}}}\left\{\frac{1}{11} + \frac{1}{7}(\sec x + \tan x)^2\right\} + K$$

A. $-\frac{1}{(\sec x + \tan x)^{11/2}}\left\{\frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2\right\} + K$

B. $\frac{1}{(\sec x + \tan x)^{1/11}}\left\{\frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2\right\} + K$

C. $-\frac{1}{(\sec x + \tan x)^{11/2}}\left\{\frac{1}{11} + \frac{1}{7}(\sec x + \tan x)^2\right\} + K$

D. $\frac{1}{(\sec x + \tan x)^{11/2}}\left\{\frac{1}{11} + \frac{1}{7}(\sec x + \tan x)^2\right\} + K$

Answer: C

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Single Correct Answer Type

1. Evaluate: $\int \frac{\cos 5x + \cos 4x}{1 - 2\cos 3x}\, dx$

A. $-\left(\frac{\sin 2x}{2} + \cos x\right) + C$

B. $-\left(\frac{\sin 2x}{2} + \cos x\right) + C$

C. $-\left(\frac{\cos 2x}{2} + \cos x\right) + C$

D. $-\left(\frac{\sin 2x}{2} + \sin x\right) + C$

Answer: D

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2. $\int \frac{\sec x.\ \operatorname{cosec} x}{2\cot x - \sec x \operatorname{cosec} x}\, dx$ is equal to

A. $\frac{1}{2}\ln|\sec 2x + \tan 2x| + C$

B. $\ln|\sec x + \operatorname{cosec} x| + C$

C. $\ln|\sec x + \tan x| + C$

D. $\frac{1}{2}\ln|\sec x + \operatorname{cosec} x| + C$

Answer: A

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3. Evaluate: $\int \frac{1}{x}\ln\left(\frac{x}{e^x}\right)dx =$

A. $\frac{1}{2}e^x - \ln x + C$

B. $\frac{1}{2}\ln x - e^x + C$

C. $\frac{1}{2}(\ln x)^2 - x + C$

D. $\frac{e^x}{2x} + C$

Answer: C

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4. Evaluate $\int \frac{(\cos x)^{n-1}}{(\sin x)^{n+1}} dx =$

(A) $-\frac{\cot^n x}{n} + c$

(B) $-\frac{\cot^n x}{n+1} + c$

(C) $\frac{\cot^n x}{n} + c$

(D) $\frac{\cot^n x}{n+1} + c$

A. $\frac{\cot^n x}{n}$

B. $\frac{-\cot^{n-1} x}{n-1}$

C. $\frac{-\cot^n x}{n}$

D. $\frac{\cot^{n-1} x}{n-1}$

Answer: C

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5. If $\int x^{26}.(x-1)^{17}.(5x-3)dx = \frac{x^{27}.(x-1)^{18}}{k} + C$ where C is a constant of integration, then the value of k is equal to

A. 3

B. 6

C. 9

D. 12

Answer: C

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6. If $\int \frac{x + \left(\cos^{-1}3x\right)^2}{\sqrt{1-9x^2}}dx = A\sqrt{1-9x^2} + B\left(\cos^{-1}3x\right)^3 + C,$ then A-B is

A. $\frac{2}{9}$

B. $-\frac{1}{9}$

C. $\frac{1}{9}$

D. 0

Answer: D

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7. If $\int\left(\tan^9 x\right)dx = f(x) + \log|\cos x|,$ where f(x) is a polynomial of degree n in tan x, then the value of n is

A. 6

B. 7

C. 8

D. none of these

Answer: C

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8. $\int \frac{\cos x - \sin x + 1 - x}{e^x + \sin x + x} dx = \log_e(f(x)) + g(x) + C$ where C is the constant of integration and f(x) is positive. Then $f(x) + g(x)$ has the value equal to

A. $e^x + \sin x + 2x$

B. $e^x + \sin x$

C. $e^x - \sin x$

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

Answer: B

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

A. $\frac{3x^{\frac{2}{3}}}{4} + 6\tan^{-1}\left(x^{\frac{1}{6}}\right) + C$

B. $\frac{3x^{\frac{2}{3}}}{2} + 6\tan^{-1}\left(x^{\frac{1}{6}}\right) + C$

C. $\frac{3x^{\frac{2}{3}}}{10} + 6\tan^{-1}\left(x^{\frac{1}{6}}\right) + C$

D. $\frac{3x^{\frac{2}{3}}}{5} + 6\tan^{-1}\left(x^{\frac{1}{6}}\right) + C$

Answer: B

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10. $\int \frac{e^x(x-2)}{x\left(x^2+e^x\right)} dx \, \forall x > 0$ is equal to

A. $\ln\left(1 + \frac{e^x}{x^2}\right) + c$

B. $\ln\left(-\frac{1}{2} + \frac{e^x}{x^2}\right) + c$

C. $\ln\left(2 + \frac{e^x}{x^2}\right) + c$

D. $\ln\left(x + \frac{e^x}{x^2}\right) + c$

Answer: A

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11. If $x^2 \neq n\pi - 1, n \in N.$ Then, the value of $\int x\sqrt{\frac{2\sin\left(x^2+1\right) - \sin 2\left(x^2+1\right)}{2\sin\left(x^2+1\right) + \sin 2\left(x^2+1\right)}}dx$ is equal to:

A. $\ln\left|\frac{1}{2}\sec\left(x^2+1\right)\right| + C$

B. $\ln\left|\sec\left(\frac{x^2+1}{2}\right)\right| + C$

C. $\frac{1}{2}\ln\left|\sec\left(x^2+1\right)\right| + C$

D. $\frac{1}{2}\ln\left|\frac{2}{\sec\left(x^2+1\right)}\right| + C$

Answer: B

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12. The value of $\int \frac{\text{cosec } x}{\cos^2\left(1 + \text{logtan.} \frac{x}{2}\right)} dx$ is

A. $-\tan\left(1 + \text{logtan.} \frac{x}{2}\right) + c$

B. $\sec^2\left(1 + \text{logtan.} \frac{x}{2}\right) + c$

C. $\tan\left(1 + \text{logtan.} \frac{x}{2}\right) + c$

D. $\sin^2\left(1 + \text{logtan.} \frac{x}{2}\right) + c$

Answer: C

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13. Evaluate: $\int \frac{dx}{x\sqrt{x^6 - 16}} =$

A. $\text{sec.} \frac{x^3}{4} + c$

B. $\frac{1}{12}\text{sec.} \frac{x^3}{4} + c$

C. $\frac{1}{3}\sec.\ \frac{x^3}{4} + c$

D. none of these

Answer: B

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14. $\int \frac{dx}{\cos(2x)\cos(4x)}$ is equal to

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

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

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

D. none of these

Answer: B

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

A. $\frac{2^{\ln\left(x^2+1\right)}}{2\left(x^2+1\right)} + C$

B. $\left(x^2+1\right)\frac{2^{\ln\left(x^2+1\right)}}{\ln 2 + 1}$

C. $\frac{\left(x^2+1\right)^{\ln 2+1}}{2(\ln 2 + 1)} + C$

D. $\frac{\left(x^2+1\right)^{\ln 2}}{2(\ln 2 + 1)} + C$

Answer: C

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16. If $\int \frac{\sin x}{\sin\left(x - \frac{\pi}{4}\right)} dx = Af(x) + \frac{1}{\sqrt{2}}\log[|\sin x - \cos x|] + c,$ then

A. $A = \frac{1}{\sqrt{2}}, f(x) = \sin x$

B. $A = \sqrt{2}, f(x) = \cos x$

C. $A = \sqrt{2}, f(x) = x$

D. $A = \frac{1}{\sqrt{2}}, f(x) = x$

Answer: D

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17. Evaluate: $\int \left(\sqrt{\frac{\cos x}{x}} - \sqrt{\frac{x}{\cos x}} \sin x \right) dx$ equals

A. $-\sqrt{x \cos x} + C$

B. $\sqrt{x \sin x} + C$

C. $2\sqrt{x \cos x} + C$

D. $C - 2\sqrt{x \cos x}$

Answer: C

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

A. $\frac{x^3}{\left(x^2+4x+1\right)^{1/2}} + C$

B. $\frac{x}{\left(x^2+4x+1\right)^{1/2}} + C$

C. $\frac{x^2}{\left(x^2+4x+1\right)^{1/2}} + C$

D. $\frac{1}{\left(x^2+4x+1\right)^{1/2}} + C$

Answer: B

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19. If $\int \frac{(2x+3)dx}{x(x+1)(x+2)(x+3)+1} = C - \frac{1}{f(x)}$ where f(x) is of the form of $ax^2 + bx + c$, then the value of f(1) is

A. 4

B. 5

C. 6

D. none

Answer: B

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20. The integral $\int \sqrt{\cot x} e^{\sqrt{\sin x}} \sqrt{\cos x} dx$ equals

A. $\frac{\sqrt{\tan x} e^{\sqrt{\sin x}}}{\sqrt{\cos x}} + C$

B. $2e^{\sqrt{\sin x}} + C$

C. $-\frac{1}{2} e^{\sqrt{\sin x}} + C$

D. $\frac{\sqrt{\cot x} e^{\sqrt{\sin x}}}{2\sqrt{\cos x}} + C$

Answer: B

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21. Evaluate : $\int \frac{dx}{x\sqrt{x^6+1}}$ equals

A. $\sec^{-1}x^3 + C$

B. $\frac{1}{6}\log\left(\frac{\sqrt{x^6+1}-1}{\sqrt{x^6+1}+1}\right) + C$

C. $\frac{1}{3}\log\left(\frac{\sqrt{x^3+1}-1}{\sqrt{x^3+1}+1}\right) + C$

D. $\frac{1}{3}\log\left(\frac{\sqrt{x^3+1}+1}{\sqrt{x^3+1}-1}\right) + C$

Answer: B

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22. $\int \frac{dx}{\left(1+\sqrt{x}\right)^{2010}} = 2\left[\frac{1}{\alpha\left(1+\sqrt{x}\right)^{\alpha}} - \frac{1}{\left(\beta\left(1+\sqrt{x}\right)\right)^{\beta}}\right] + c$ where $\alpha, \beta > 0$ then $\alpha - \beta$ is

A. 1

B. 2

C. -1

D. -2

Answer: A

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23. $\int \frac{\sin\left(\frac{\pi}{4} - x\right)dx}{2 + \sin 2x} = A\tan^{-1}(f(x)) + B$, where A, B are contants. Then the range of Af(x) is

A. $[-1, 1]$

B. $\left[-\sqrt{2}, \sqrt{2}\right]$

C. $[0, 1]$

D. $[-1, 0]$

Answer: A

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24. If $\int\sqrt{x+\sqrt{x^2+2}}dx = A\left\{x+\sqrt{x^2+2}\right\}^{3/2} + \frac{B}{\sqrt{x+\sqrt{x^2+2}}} + c.$ then the value of 3AB is

A. -1

B. -2

C. 1

D. 2

Answer: B

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25. $\int \frac{x^2+1}{x\sqrt{x^2+2x-1}\sqrt{1-x^2-x}}dx$ is equal to

A. $2\sin^{-1}\sqrt{x-\frac{1}{x}+2}+c$

B. $2\cos^{-1}\sqrt{x - \frac{1}{x} + 2} + c$

C. $\sin^{-1}\sqrt{x - \frac{1}{x} + 2} + c$

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

Answer: A

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26. $\int \frac{dx}{x^2\sqrt{16 - x^2}}$ has the value equal to

A. $C - \frac{1}{4}\tan^{-1}\sec\left(\frac{x}{4}\right)$

B. $\frac{1}{4}\tan^{-1}\sec\left(\frac{x}{4}\right) + C$

C. $C - \frac{\sqrt{16 - x^2}}{16x}$

D. $\frac{\sqrt{16 - x^2}}{16x} + C$

Answer: C

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

A. 2

B. 3

C. 6

D. 8

Answer: C

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

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

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

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

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

Answer: A

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29. $\int \frac{3x^2+2x}{x^6+2x^5+x^4+2x^3+2x^2+5}dx =$

A. $\frac{1}{4}\tan^{-1}\left(\frac{x^3+x^2+1}{2}\right)+c$

B. $\frac{1}{2}\tan^{-1}\left(\frac{x^3+x^2+1}{2}\right)+c$

C. $\sin^{-1}\left(\frac{x^3+x^2+1}{2}\right)+c$

D. $\frac{1}{2}\tan^{-1}\left(\frac{x^3+x^2}{2}\right)+c$

Answer: B

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

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

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

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

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

Answer: C

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31. If $f(x)=\int \frac{5x^8+7x^6}{\left(x^2+1+2x^7\right)^2}dx$, $(x \geq 0)$, and f(0) = 0, then the value of f(1) is

A. $-1/2$

B. $1/4$

C. $1/2$

D. $-1/4$

Answer: B

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32. If $I = \int \frac{dx}{x^4\sqrt{a^2+x^2}}$, then I equals

A. $\frac{1}{a^4}\left[\frac{1}{x}\sqrt{a^2+x^2} - \frac{1}{3x^2}\sqrt{a^2+x^2}\right] + c$

B. $\frac{1}{a^4}\left[\frac{1}{x}\sqrt{a^2+x^2} - \frac{1}{2\sqrt{x}}\left(a^2+x^2\right)^{3/2}\right] + c$

C. $\frac{1}{a^4}\left[\frac{1}{x}\sqrt{a^2+x^2} - \frac{1}{3x^3}\left(a^2+x^2\right)^{3/2}\right] + c$

D. $\frac{1}{a^4}\left[\frac{1}{x}\sqrt{a^2+x^2} - \frac{1}{3x^3}\sqrt{a^2+x^2}\right] + c$

Answer: C

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33. If $I = \int x^{27}\left(6x^2 + 5x + 4\right)\left(x^2 + x + 1\right)^6 dx = f(x) + C$, then f(x) is equal to

A. $\frac{x^4\left(1 + x + x^2\right)^7}{7} + C$

B. $\frac{x^{28}\left(1 + x + x^2\right)^7}{7} + C$

C. $\frac{x^{28}\left(1 + x + x^2\right)^7}{28} + C$

D. None

Answer: B

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34. $\int \frac{x^2(1 - \log x)}{(\log x)^4 - x^4} dx$ equals

A. $\frac{1}{2}\ln.\frac{x}{\ln x} - \frac{1}{4}\ln\left(\ln^2 x - x^2\right) + C$

B. $\frac{1}{4}\ln\left(\frac{\ln x - x}{\ln x + x}\right) - \frac{1}{2}\tan^{-1}\left(\frac{\ln x}{x}\right) + C$

C. $\frac{1}{4}\ln\left(\frac{\ln x - x}{\ln x + x}\right) + \frac{1}{2}\tan^{-1}\left(\frac{\ln x}{x}\right) + C$

D. $\frac{1}{4}\left(\ln\left(\frac{\ln x - x}{\ln x + x}\right) + \tan^{-1}\left(\frac{\ln x}{x}\right)\right) + C$

Answer: B

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35. $\int \frac{x(x-1)}{\left(x^2+1\right)(x+1)\sqrt{x^3+x^2+x}} = \frac{1}{2}\log\left|\frac{\sqrt{x+\frac{1}{x}+1}-1}{\sqrt{x+\frac{1}{x}+1}+1}\right| - A + c.$

Then the value of A is equal to

A. $\cos^{-1}\sqrt{1+\frac{1}{x}}$

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

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

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

Answer: B

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36. $\int \frac{d\left(x^3\right)}{x^3\left(x^n+1\right)}$ equals

A. $\frac{3}{n}\ln\left(\frac{x^n}{x^n+1}\right)$

B. $\frac{1}{n}\ln\left(\frac{x^n}{x^n+1}\right)$

C. $\frac{3}{n}\ln\left(\frac{x^n+1}{x^n}\right)$

D. $3n\ln\left(\frac{x^{n+1}}{x^n}\right)$

Answer: A

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

A. $\log_e x + c$

B. $\log_e x + 2\tan^{-1} x + c$

C. $\log_e . \frac{1}{x^2+1} + c$

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

Answer: B

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38. $\int \frac{x^3 - x}{1+x^6} dx$ is equal to

A. $\frac{1}{6}\log . \frac{x^4 - x^2 + 1}{x\left(x^2+1\right)} + C$

B. $\frac{1}{6}\tan^{-1} . \frac{\left(x^2+1\right)^2}{2} + C$

C. $\log. \frac{x^4 - x^2 + 1}{\left(1 + x^2\right)^2} + C$

D. $\tan^{-1}. \frac{\left(x^2 + 1\right)^2}{2} + C$

Answer: A

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39. $\int \frac{x^3 - 1}{\left(x^4 + 1\right)(x + 1)} dx$ is

A. $\frac{1}{4}\ln\left(1 + x^4\right) + \frac{1}{3}\ln\left(1 + x^3\right) + c$

B. $\sin x \mid -\sin x + C$

C. $\frac{1}{4}\ln\left(1 + x^4\right) - \ln(1 + x) + c$

D. $\frac{1}{4}\ln\left(1 + x^4\right) + \ln(1 + x) + c$

Answer: C

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40. The value of $\int \frac{\cos^3 x}{\sin^2 x + \sin x} dx$ is equal to

A. $\log_e|\sin x| + \sin x + C$

B. $\log_e|\sin x| - \sin x + C$

C. $-\log_e|\sin x| - \sin x + C$

D. $-\log_e|\sin x| + \sin x + C$

Answer: B

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41. $\int \frac{x^3 - 1}{x^3 + x}$ dx is equal to:

A. $x - \log_e|x| + \log_e\left(x^2 + 1\right) - \tan^{-1} x + C$

B. $x - \log_e|x| + \frac{1}{2}\log_e\left(x^2 + 1\right) - \tan^{-1} x + C$

C. $x + \log_e|x| + \frac{1}{2}\log_e\left(x^2 + 1\right) + \tan^{-1} x + C$

D. none of these

Answer: B

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42. $\int \frac{(2+\sec x)\sec x}{(1+2\sec x)^2} dx =$

A. $\frac{1}{2\ \text{cosec}\ x + \cot x} + C$

B. $2\ \text{cosec}\ x + \cot x + C$

C. $\frac{1}{2\ \text{cosec}\ x - \cot x} + C$

D. $2\ \text{cosec}\ x - \cot x + C$

Answer: A

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43. If $\int f(x)dx = g(x) + c$ and $f^{-1}(x)$ is differentiable, then $\int f^{-1}(x)dx$ equal to

A. $g^{-1}(x) + C$

B. $xf^{-1} + C$

C. $xf^{-1}(x) - g\left(f^{-1}(x)\right) + C$

D. $f^{-1}(x) + C$

Answer: C

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44. $\int \frac{e^{\cot x}}{\sin^2 x}(2 \ln \operatorname{cosec} x + \sin 2x)dx$

A. $2e^{\cot x}\ln|\sin x| + c$

B. $2e^{\tan x}\ln|\sin x| + c$

C. $2e^{\cot x}\ln|\cos x| + c$

D. $2e^{\tan x}\ln|\cos x| + c$

Answer: A

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45. $\int \frac{1 - 7\cos^2 x}{\sin^7 x \cos^2 x} dx = \frac{f(x)}{(\sin x)^7} + C$, then f(x) is equal to

A. $\sin x$

B. $\cos x$

C. $\tan x$

D. $\cot x$

Answer: C

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46. If $f(x) = \int e^x \left(\tan^{-1} x + \frac{2x}{\left(1 + x^2\right)^2} \right) dx$, $f(0) = 0$ then the value of f(1) is

A. $e\left(\frac{\pi}{4} - \frac{1}{2}\right) + 1$

B. $e\left(\frac{\pi}{4} + \frac{1}{2}\right) + 1$

C. $e\left(\frac{\pi}{2} - \frac{1}{4}\right) + 1$

D. $e^{-1}\left(\frac{\pi}{4}-\frac{1}{2}\right)+1$

Answer: A

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47. $\int \frac{e^x(x-1)(x-\ln x)}{x^2}dx$ is equal to

A. $e^x\left(\frac{x-\ln x}{x}\right)+c$

B. $e^x\left(\frac{x-\ln x+1}{x}\right)+c$

C. $e^x\left(\frac{x-\ln x}{x^2}\right)+c$

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

Answer: D

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48. $\int\left(\sin(101x).\sin^{99}x\right)dx$ equals

A. $\frac{\sin(100x)(\sin x)^{100}}{100}+C$

B. $\frac{\cos(100x)(\sin x)^{100}}{100}+C$

C. $\frac{\cos(100x)(\cos x)^{100}}{100}+C$

D. $\frac{\cos(100x)(\cos x)^{100}}{100}+C$

Answer: A

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Subjective Type

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

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2. Evaluate : $\int \frac{x^2 - 4}{x^4 + 9x^2 + 16} dx$

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3. Evaluate: $\int \cos 2x \ \ln \ (1 + \tan x) dx$

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4. Evaluate : $\int \sin 4x . \ e^{\tan^2 x} dx$

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

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

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Comprehension Type

1. Let $f(x)=\int \frac{dx}{e^x+8e^{-x}+4e^{-3x}}, g(x)=\int \frac{dx}{e^{3x}+8e^x+4e^{-x}}.$

$\int (f(x)-2g(x))dx$

A. $\frac{1}{2}\log\left|\frac{e^x+2e^{-x}-2}{e^x+2e^{-x}+2}\right|+C$

B. $\frac{1}{4\sqrt{3}}\log\left|\frac{e^x-2e^{-x}-2\sqrt{3}}{e^x+2e^{-x}+2\sqrt{3}}\right|+C$

C. $\frac{1}{2\sqrt{3}}\tan^{-1}\left(\frac{e^x-2e^{-x}}{2\sqrt{3}}\right)+C$

D. $\frac{1}{2}\tan^{-1}\left(\frac{e^x+2e^{-x}}{2}\right)+C$

Answer: D

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2. Let $f(x) = \int \frac{dx}{e^x + 8e^{-x} + 4e^{-3x}}, g(x) = \int \frac{dx}{e^{3x} + 8e^x + 4e^{-x}}.$

$\int (f(x) - 2g(x))dx$

A. $\frac{1}{4\sqrt{3}} \log \left| \frac{e^x - 2e^{-x} - 2\sqrt{3}}{e^x + 2e^{-x} + 2\sqrt{3}} \right| + C$

B. $\frac{1}{2} \tan^{-1} \left(\frac{e^x + 2e^{-x}}{2} \right) + C$

C. $\frac{1}{2\sqrt{3}} \tan^{-1} \left(\frac{e^x - 2e^{-x}}{2\sqrt{3}} \right) + C$

D. $\frac{1}{4} \log \left| \frac{e^x + 2e^{-x} - 2}{e^x + 2e^{-x} + 2} \right| + C$

Answer: B

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Multiple Correct Answer Type

1. If $\int \frac{e^{4x}-1}{e^{2x}} \log\left(\frac{e^{2x}+1}{e^{2x}-1}\right) dx = \frac{t^2}{2}\log t - \frac{t^2}{4} - \frac{u^2}{2}\log u + \frac{u^2}{4} + C$, then

A. (a) $u = e^x + e^{-x}$

B. (b) $u = e^x - e^{-x}$

C. (c) $t = e^x + e^{-x}$

D. (d) $t = e^x - e^{-x}$

Answer: B::C

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

A. $f(x) = x - 1$

B. $g(x) = \frac{\sqrt{1+e^x}-1}{\sqrt{1+e^x}+1}$

C. $g(x) = \frac{\sqrt{1+e^x}+1}{\sqrt{1+e^x}-1}$

D. $f(x) = 2(x - 2)$

Answer: B::D

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