Utilizziamo la formula fondamentale:

$$\int_a^b f(x)\,dx = [\varphi(x)]_a^b = \varphi(b) - \varphi(a),$$

dove $\varphi(x)$ è una qualunque primitiva di $f(x)$.
Determiniamo le primitive di $3x^2 + x$:

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

Una primitiva è dunque $\varphi(x) = x^3 + \frac{1}{2}x^2$.

Pertanto si ha:

$$\int_1^2 (3x^2 + x)\,dx = \left[x^3 + \frac{1}{2}x^2\right]_1^2.$$

Sostituiamo alla variabile x dentro la parentesi quadra prima 2 e poi 1 e calcoliamo la differenza:

$$\left[x^3 + \frac{1}{2}x^2\right]_1^2 = (8+2) - \left(1 + \frac{1}{2}\right) = \frac{17}{2}.$$

Quindi $\int_1^2 (3x^2 + x)\,dx = \frac{17}{2}$.

Calcola i seguenti integrali definiti.

51 $\int_3^4 (5-6x)\,dx$ $[-16]$

52 $\int_{-2}^0 (3x^2 - x)\,dx$ $[10]$

53 $\int_0^1 (x^2 + x)\,dx$ $\left[\frac{5}{6}\right]$

54 $\int_{-2}^1 \frac{3x^2+2x-1}{3}\,dx$ $[1]$

55 $\int_1^2 \left(x^2 + \frac{1}{x^2}\right)dx$ $\left[\frac{17}{6}\right]$

56 $\int_4^9 (3\sqrt{x} + 2x)\,dx$ $[103]$

57 $\int_0^1 (\sqrt[3]{x} - x)\,dx$ $\left[\frac{1}{4}\right]$

58 $\int_2^3 \left(2x + \frac{1}{x} + 1\right)dx$ $\left[6 + \ln\frac{3}{2}\right]$

59 $\int_0^1 4(x+1)^3\,dx$ $[15]$

60 $\int_{-3}^0 (2x^2 + 5)\,dx$ $[33]$

61 $\int_{-1}^1 (x^3 - 3x^2 + 1)\,dx$ $[0]$

62 $\int_0^3 |x-1|\,dx$ $\left[\frac{5}{2}\right]$

63 $\int_{\frac{1}{4}}^{\frac{1}{2}} \left(\frac{1}{x^3} + \frac{1}{x^2}\right)dx$ $[8]$

64 $\int_1^4 \frac{x-1}{x}\,dx$ $[3 - 2\ln 2]$

65 $\int_2^7 \frac{1}{\sqrt{x+2}}\,dx$ $[2]$

66 $\int_1^{\pi+1} \sin(x-1)\,dx$ $[2]$

67 $\int_0^2 \frac{4x}{1+x^2}\,dx$ $[2\ln 5]$

68 $\int_3^8 \frac{3\sqrt{x+1}}{2}\,dx$ $[19]$

69 $\int_{-1}^{-\frac{1}{2}} \left(\frac{3}{x^4} - \frac{2}{x^2}\right)dx$ $[5]$

70 $\int_{-2}^{-1} \frac{x^2+1}{x}\,dx$ $\left[-\frac{3}{2} - \ln 2\right]$

71 $\int_1^2 \frac{3x^3-2}{x}\,dx$ $[7 - \ln 4]$

72 $\int_1^e \frac{1-x}{x^2}\,dx$ $\left[-\frac{1}{e}\right]$

73 $\int_0^1 \frac{4x}{1+6x^2}\,dx$ $\left[\frac{1}{3}\ln 7\right]$

74 $\int_0^{\frac{1}{2}} \frac{4}{1+4x^2}\,dx$ $\left[\frac{\pi}{2}\right]$

75 $\int_0^1 x^3(x^4+1)^5\,dx$ $\left[\frac{21}{8}\right]$

76 $\int_0^2 x(x^2-1)^3\,dx$ $[10]$

77 $\int_{-1}^4 x|3-x|\,dx$ $\left[\frac{9}{2}\right]$

78 $\int_0^{\sqrt{8}} 6x\sqrt{x^2+1}\,dx$ $[52]$

79 $\int_{-1}^0 \frac{x^3}{x^4+1}\,dx$ $\left[-\frac{1}{4}\ln 2\right]$

80 $\int_0^1 \frac{x}{(x^2-2)^4}\,dx$ $\left[\frac{7}{48}\right]$

81 $\int_1^e \frac{6\ln^2 x}{x}\,dx$ $[2]$

82 $\int_0^{\frac{\pi}{3}} \tan x\,dx$ $[\ln 2]$

83 $\int_1^3 \frac{4x+3}{2x^2+3x}\,dx$ $[\ln 27 - \ln 5]$

84 $\int_2^{\sqrt{5}} 6x\sqrt{x^2-4}\,dx$ $[2]$

ESERCIZI

85 $\int_0^1 \frac{2}{x^2+6x+9}\,dx$ $\left[\frac{1}{6}\right]$

86 $\int_2^4 \frac{2x^2+x+1}{2x-1}\,dx$ $[8+\ln 7-\ln 3]$

87 $\int_1^5 \left(3\sqrt{x}+\frac{1}{2\sqrt{x}}\right)dx$ $[11\sqrt{5}-3]$

88 $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} x\cos x\,dx$ $[0]$

89 $\int_{-1}^4 (x+\ln 2\cdot 2^x)\,dx$ $[23]$

90 $\int_{\frac{\pi}{6}}^{\frac{\pi}{2}} \frac{\cos x}{\sin x+1}\,dx$ $[\ln 4-\ln 3]$

91 $\int_0^{\pi} (\sin x-\cos x)\,dx$ $[2]$

92 $\int_0^{\pi} \sin 2x\,dx$ $[0]$

93 $\int_2^4 x\ln\left(\frac{x}{2}\right)dx$ $[8\ln 2-3]$

94 $\int_1^e (\ln x+x)\,dx$ $\left[\frac{e^2}{2}+\frac{1}{2}\right]$

95 $\int_0^1 \frac{e^x}{e^x+1}\,dx$ $\left[\ln\frac{e+1}{2}\right]$

96 $\int_0^1 2xe^{x^2}\,dx$ $[e-1]$

97 $\int_1^{e^2} \ln x\,dx$ $[e^2+1]$

98 $\int_0^1 (2x-1)\,5^{x^2-x}\,dx$ $[0]$

99 $\int_{-1}^2 xe^x\,dx$ $\left[e^2+\frac{2}{e}\right]$

100 $\int_0^1 xe^{x-1}\,dx$ $\left[\frac{1}{e}\right]$

101 $\int_0^{\frac{\pi}{2}} \frac{\cos x}{(\sin x+1)^2}\,dx$ $\left[\frac{1}{2}\right]$

102 $\int_1^2 \frac{1}{x\sqrt{1-\ln^2 x}}\,dx$ $[\arcsin \ln 2]$

103 $\int_1^2 2x\ln x\,dx$ $\left[4\ln 2-\frac{3}{2}\right]$

104 $\int_4^9 \frac{e^{2\sqrt{x}-4}}{2\sqrt{x}}\,dx$ $\left[\frac{e^2}{2}-\frac{1}{2}\right]$

105 $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} 2\tan x\,dx$ $\left[-2\ln\frac{\sqrt{3}}{3}\right]$

106 $\int_{\frac{\pi^2}{36}}^{\frac{\pi^2}{9}} \frac{\cos\sqrt{x}}{\sqrt{x}}\,dx$ $[\sqrt{3}-1]$

107 $\int_0^{\pi} \frac{\sin x}{\sqrt{3+\cos x}}\,dx$ $[4-2\sqrt{2}]$

108 $\int_0^2 \frac{e^x}{(e^x+1)^2}\,dx$ $\left[\frac{e^2-1}{2(e^2+1)}\right]$

109 $\int_{-\frac{\pi}{10}}^{\frac{\pi}{10}} \tan 2x\,dx$ $[0]$

110 $\int_{\frac{\pi}{8}}^{\pi} (\sin 2x+\cos 4x)\,dx$ $\left[\frac{\sqrt{2}-3}{4}\right]$

111 $\int_1^3 \frac{1}{x(1+x)}\,dx$ $\left[\ln\frac{3}{2}\right]$

112 $\int_1^4 \left(5x\sqrt{x}-\frac{1}{x}\right)dx$ $[62-\ln 4]$

113 $\int_{\frac{2}{3}}^{\frac{e+1}{3}} \frac{3}{3x-1}\,dx$ $[1]$

114 $\int_1^e \frac{1}{x(1+\ln^2 x)}\,dx$ $\left[\frac{\pi}{4}\right]$

115 $\int_{\sqrt{2}}^{2\sqrt{2}} \frac{6x}{(x^2+1)^2}\,dx$ $\left[\frac{2}{3}\right]$

116 $\int_{\frac{1}{3}}^{\frac{1}{2}} \frac{e^{\frac{1}{x}}}{x^2}\,dx$ $[e^3-e^2]$

117 $\int_0^{\ln\frac{1}{4}} \frac{e^x}{\cos^2(\pi e^x)}\,dx$ $\left[\frac{1}{\pi}\right]$

118 $\int_0^8 \frac{1}{\sqrt{64-x^2}}\,dx$ $\left[\frac{\pi}{2}\right]$

119 $\int_0^{\frac{\sqrt{3}}{3}} \frac{4x}{1+9x^4}\,dx$ $\left[\frac{\pi}{6}\right]$

120 $\int_{\frac{\pi}{2}}^{\frac{2}{3}\pi} \frac{\sin 2x}{4\sin^2 x}\,dx$ $\left[\frac{1}{2}\ln\frac{\sqrt{3}}{2}\right]$

121 $\int_0^1 \arctan x\,dx$ $\left[\frac{\pi-\ln 4}{4}\right]$

122 $\int_e^{e^2} \frac{2}{x\ln^2 x}\,dx$ $[1]$

123 $\int_0^1 \arcsin x\,dx$ $\left[\frac{\pi-2}{2}\right]$

124 $\int_0^{\frac{\sqrt{3}}{2}} \frac{4x}{\sqrt{1-x^2}}\,dx$ $[2]$

125 $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} x\sin x\,dx$ $[2]$

126 $\int_3^4 \frac{1}{(x-1)\ln(x-1)}\,dx$ $[\ln\ln 3-\ln\ln 2]$

127 $\int_0^1 x\cdot 3^x\,dx$ $\left[\frac{3\ln 3-2}{\ln^2 3}\right]$

128 $\int_0^{\frac{\pi}{2}} e^x\cos x\,dx$ $\left[\frac{1}{2}\left(e^{\frac{\pi}{2}}-1\right)\right]$

129 $\int_0^2 \frac{x+2}{e^{x-3}}\,dx$ $[3e^3-5e]$