ESERCITAZIONE di MATEMATICA GENERALE - CLEF

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Calcolo Integrale

Es. 1. [Integrali Indefiniti Immediati]

(**1**.1) $\int x^2 + x + 10\,dx$

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

(**1**.3) $\int 3\sqrt{x} - 6\sqrt[4]{x^3}\,dx$

(**1**.4) $\int \frac{x+2}{\sqrt{x}}\,dx$

(**1**.5) $\int \frac{1}{3x^2} - 2x^3 + \frac{1}{\sqrt[3]{x^2}}\,dx$

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

(**1**.7) $\int 4e^x + 5 \cdot 2^x\,dx$

(**1**.8) $\int e^{x-1} - \frac{e^{x^2-2x+5}}{e^{x^2-x}}\,dx$

(**1**.9) $\int e^x(1 - 2xe^{-x})\,dx$

(**1**.10) $\int 5e^x - \frac{1}{x}\,dx$

(**1**.11) $\int 2 - e^{x-2} - 5^x + \sqrt{x}\,dx$

Es. 2. [Integrali Indefiniti - Funzioni Composte]

(**A**) $\int f' \cdot [f]^\alpha\,dx = \frac{[f]^{\alpha+1}}{\alpha+1} + \text{cost.}$

(**B**) $\int \frac{f'}{f}\,dx = \ln|f| + \text{cost.}$

(**C**) $\int f' \cdot e^f\,dx = e^f + \text{cost.}$

(**2**.1) $\int 2x(x^2-1)^3\,dx$

(**2**.2) $\int (3x-2)^4\,dx$

(**2**.3) $\int (x^2+x-1)^5(x+1)\,dx$

(**2**.4) $\int x\sqrt{x^2+1}\,dx$

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

(**2**.6) $\int e^{2x}\sqrt{5+e^{2x}}\,dx$

(**2**.7) $\int \frac{x^2+\ln^2(x)}{x}\,dx$

(**2**.8) $\int \frac{1}{2x+5}\,dx$

(**2**.9) $\int \frac{x^2}{x^3+2}\,dx$

(**2**.10) $\int \frac{x+1}{x-3}\,dx$

(**2**.11) $\int \frac{3x^2+4x+1}{x^3+2x^2+x}\,dx$

(**2**.12) $\int \frac{x}{x-10}\,dx$

(**2**.13) $\int \frac{8x^3}{x^4+1}\,dx$

(**2**.14) $\int e^{-x} + 2\,dx$

(**2**.15) $\int e^{3x+1}\,dx$

(**2**.16) $\int xe^{-x^2}\,dx$

(**2**.17) $\int \frac{e^{\frac{1}{x}}}{x^2}\,dx$

(**2**.18) $\int \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$

(**2**.19) $\int (x^3-1)e^{-x^4+4x}\,dx$

(**2**.20) $\int \frac{e^{\sqrt{2x-1}}}{\sqrt{2x+1}}\,dx$

Es. 3. Calcola i seguenti integrali **per Sostituzione**.

(**3**.1) $\int \frac{1+e^{\sqrt{x}}}{\sqrt{x}}\,dx \quad (t = \sqrt{x})$.

(**3**.2) $\int \frac{e^x}{e^{2x}+1}\,dx \quad (t = e^x)$

(**3**.3) $\int \frac{x}{\sqrt{x-1}}\,dx \quad (t = \sqrt{x-1})$

(**3**.4) $\int \frac{1}{\sqrt[3]{1-x}}\,dx$

(**3**.5) $\int \frac{1}{x-\sqrt{x}}\,dx$

(**3**.6) $\int \frac{x+3}{\sqrt{x+2}}\,dx$

(**3**.7) $\int \frac{e^x}{e^x-e^{-x}}\,dx$

(**3**.8) $\int \frac{1}{\sqrt{x}+3}\,dx$

Es. 4. Calcola i seguenti integrali **per Parti:** $\int (f \cdot g')\,dx = f \cdot g - \int (f' \cdot g)\,dx$

(**4**.1) $\int \ln(x)\,dx$

(**4**.2) $\int x^2 \ln(x)\,dx$

(**4**.3) $\int xe^x\,dx$

(**4**.4) $\int \frac{\ln(x)}{x^2}\,dx$

(**4**.5) $\int \frac{\ln(x)}{2\sqrt{x}}\,dx$

(**4**.6) $\int \ln^2(x)\,dx$

(**4**.7) $\int \frac{x}{2\sqrt{x+1}}\,dx$

(**4**.8) $\int 2x\,e^{2x}\,dx$

(**4**.9) $\int \frac{x}{\sqrt{1-x^2}} \ln(x)\,dx$

Es. 5. Calcola i seguenti Integrali Indefiniti.

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

(**5**.2) $\int \left(\frac{1}{\sqrt[2]{x^5}} + \frac{x^2 + x^{\frac{1}{3}}}{x}\right) dx$

(**5**.3) $\int (x^{-1} + (1+x^2)^{-1})\,dx$

(**5**.4) $\int (x-1)^{-1}\,dx$

(**5**.5) $\int \left(\frac{x^2}{\sqrt{x}} - \frac{1}{x^2} + \sqrt[5]{x} + 2\right) dx$

(**5**.6) $\int (2x-3)^3\,dx$

(**5**.7) $\int 2x(x^2-7)^{-1}\,dx$

(**5**.8) $\int \frac{e^x}{e^x+1}\,dx$

(**5**.9) $\int \sqrt[4]{(3x-2)^3}\,dx$

(**5**.10) $\int xe^{-x^2}\,dx$

(**5**.11) $\int \frac{1+x}{1+x^2}\,dx$

(**5**.12) $\int \frac{2x}{\sqrt{1+x^2}}\,dx$

(**5**.13) $\int \frac{1}{e^x+3}\,dx$

(**5**.14) $\int \frac{\ln^3(x)}{x}\,dx$

(**5**.15) $\int \frac{1}{x\ln^5(x)}\,dx$

(**5**.16) $\int \frac{1}{3}x^2 e^{x^3}\,dx$

(**5**.17) $\int \frac{x^3}{1+x^8}\,dx$

(**5**.18) $\int \frac{1+x}{x} \frac{1}{x+\ln(x)}\,dx$

(**5**.19) $\int e^{\ln(x)} dx.$

Es. 6. Calcola i seguenti Integrali Definiti.

(**6**.1) $\int_2^5 x+1\,dx = [27/2]$

(**6**.2) $\int_0^1 x^2 + x\,dx = [5/6]$

(**6**.3) $\int_{-2}^{-1} 2e^x\,dx = [2e^{-2}(e-1)]$

(**6**.4) $\int_8^{27} \frac{e^{\sqrt[3]{x}}}{\sqrt[3]{x}}\,dx = 3(e^3 - e^2)$

(**6**.5) $\int_1^4 5x\sqrt{x} - \frac{1}{x}\,dx = [62 - \ln(4)]$

(**6**.6) $\int_{-2}^{-1} \frac{x^2+1}{x}\,dx = [-3/2 - \ln(2)]$

(**6**.7) $\int_0^1 4(x+1)^3\,dx = [15]$

(**6**.8) $\int_{-3}^0 2x^2 + 5\,dx = [33]$

(**6**.9) $\int_0^2 e^x\sqrt{e^x+1}\,dx = [\frac{2}{3}(\sqrt{(e^2+1)^3} - \sqrt{8})]$

(**6**.10) $\int_0^1 \frac{x^2}{x^3+1}\,dx = \frac{1}{3}\ln(2)$

(**6**.11) $\int_1^3 \frac{4x+3}{2x^2+3x}\,dx = \ln(27) - \ln(5)$