

Esercitazione sul calcolo di integrali indefiniti

- 1) $\int (2\sqrt{x} + x^2) dx = 2\int x^{\frac{1}{2}} dx + \int x^2 dx = \frac{4}{3}x^{\frac{3}{2}} + \frac{x^3}{3} + C$
- 2) $\int \left(-x^3 - \frac{1}{2}x^2 + \frac{4}{5}x + 3\right) dx = -\frac{x^4}{4} - \frac{x^3}{6} + \frac{2x^2}{5} + 3x + C$
- 3) $\int (x-2)(x+2)^2 dx = \int (x^3 + 2x^2 - 4x - 8) dx = \frac{x^4}{4} + \frac{2}{3}x^3 - 2x^2 - 8x + C$
- 4) $\int (2x-1)(x+1)^2 dx = \frac{x^4}{2} + x^3 - x + C$
- 5) $\int \frac{x^4 - 3x^2 + 7}{x^3} dx = \int \left(x - \frac{3}{x} + \frac{7}{x^3}\right) dx = \int x dx - 3\int \frac{1}{x} dx + 7\int x^{-3} dx = \frac{x^2}{2} - 3\ln|x| + 7\frac{x^{-3+1}}{-3+1} + C =$
 $\frac{x^2}{2} - 3\ln|x| - \frac{7}{2x^2} + C$
- 6) $\int \left(\sqrt[3]{x^2} + \frac{x^2-1}{\sqrt{x}}\right) dx = \int \left(x^{\frac{2}{3}} + \frac{x^2}{x^{\frac{1}{2}}} - x^{\frac{1}{2}}\right) dx = \int x^{\frac{2}{3}} dx + \int x^{2-\frac{1}{2}} dx - \int x^{\frac{1}{2}} dx = \frac{x^{\frac{2}{3}+1}}{\frac{2}{3}+1} + \frac{x^{\frac{3}{2}+1}}{\frac{3}{2}+1} - \frac{x^{\frac{1}{2}+1}}{\frac{1}{2}+1} + C =$
 $\frac{3}{5}x^{\frac{5}{3}} + \frac{2}{5}x^{\frac{5}{2}} - 2\sqrt{x} + C$
- 7) $\int (5e^x + 3^x) dx = 5e^x + \frac{3^x}{\ln(3)} + C$
- 8) $\int (2e^{4x} + e^{3x} + e^{-x}) dx = \frac{1}{2}\int 4e^{4x} dx + \frac{1}{3}\int 3e^{3x} dx - \int e^{-x} dx = \frac{1}{2}e^{4x} + \frac{1}{3}e^{3x} - e^{-x} + C$
- 9) $\int e^{x^2-1} \cdot x dx = \frac{1}{2}\int e^{x^2-1} \cdot 2x dx = \frac{1}{2}\int e^{x^2-1} \cdot D(x^2-1) dx = \frac{1}{2}e^{x^2-1} + C$
- 10) $\int 5^{2x} dx = \frac{1}{2}\int 5^{2x} \cdot 2 dx = \frac{1}{2} \cdot \frac{5^{2x}}{\ln(5)} + C$
- 11) $\int (e^{2x} - 3)^2 dx = \int (e^{4x} - 6e^{2x} + 9) dx = \frac{e^{4x}}{4} - 3e^{2x} + 9x + C$
- 12) $\int (\pi^{3x} - e^{-2x} + e^{3x+5}) dx = \frac{\pi^{3x}}{3 \cdot \ln(\pi)} + \frac{e^{-2x}}{2} + \frac{e^{3x+5}}{3} + C$
- 13) $\int \frac{dx}{23x+1} = \frac{1}{23} \int \frac{23dx}{23x+1} = \frac{1}{23} \cdot \ln(|23x+1|) + C$
- 14) $\int \frac{x dx}{2x^2+1} = \frac{1}{4} \int \frac{4x dx}{2x^2+1} = \frac{1}{4} \ln(2x^2+1) + C$
- 15) $\int \frac{e^x dx}{e^x+2} = \ln(e^x+2) + C$
- 16) $\int \frac{e^x dx}{e^x-2} = \ln(|e^x-2|) + C$
- 17) $\int \frac{e^{2x}-1 dx}{e^x+1} = \int \frac{\cancel{(e^x+1)}(e^x-1) dx}{\cancel{(e^x+1)}} = \int (e^x-1) dx = e^x - x + C$
- 18) $\int (4e^x - e^{-x})^2 dx = \int (16e^{2x} - 8 + e^{-2x}) dx = 8e^{2x} - 8x - \frac{e^{-2x}}{2} + C$

$$19) \int \frac{e^{2x} - 2e^x}{e^{x+1}} dx = \int \frac{e^x (e^x - 2)}{e^x \cdot e} dx = \frac{1}{e} \int (e^x - 2) dx = \frac{1}{e} (e^x - 2x) + C$$

$$20) \int \frac{2}{x \ln(x)} dx = 2 \int \frac{\frac{1}{x}}{\ln(x)} dx = 2 \ln(|\ln(x)|) + C$$