

Esercitazione sul calcolo di integrali indefiniti

- 1) $\int \left(x^2 - \frac{1}{2}x\right)^2 dx = \frac{x^5}{5} - \frac{x^4}{4} + \frac{x^3}{12} + C$
- 2) $\int \frac{\sqrt[3]{x^2} - 3\sqrt{x} + x}{\sqrt[4]{x}} dx = \frac{12x^{\frac{17}{12}}}{17} - \frac{12x^{\frac{5}{4}}}{5} + \frac{4x^{\frac{7}{4}}}{7} + C$
- 3) $\int \frac{(x^3 - 1)(x + 1)}{x^4} dx = x + \ln|x| + \frac{1}{2x^2} + \frac{1}{3x^3} + C$
- 4) $\int (2^x - \pi)^3 dx = \int (2^{3x} - 3\pi 2^{2x} + 3\pi^2 2^x - \pi^3) dx = \frac{1}{3} \int 3 \cdot 2^{3x} dx - \frac{3\pi}{2} \cdot \int 2 \cdot 2^{2x} dx + 3\pi^2 \int 2^x dx - \pi^3 \int dx =$
 $\frac{1}{3} \cdot \frac{2^{3x}}{\ln(2)} - \frac{3\pi}{2} \cdot \frac{2^{2x}}{\ln(2)} + 3\pi^2 \cdot \frac{2^x}{\ln(2)} - \pi^3 x + C$
- 5) $\int \frac{\pi}{\pi x + 5} dx = \ln|\pi x + 5| + C$
- 6) $\int \frac{(x^2 - x + 1)^2}{x^3} dx = \int \frac{1}{x^3} (x^4 - 2x^3 + 3x^2 - 2x + 1) dx = \int \left(x - 2 + \frac{3}{x} - 2x^{-2} + x^{-3}\right) dx =$
 $\frac{x^2}{2} - 2x + 3\ln|x| + \frac{2}{x} - \frac{1}{2x^2} + C$
- 7) $\int e^{2x-3} dx = \frac{e^{2x-3}}{2} + C$
- 8) $\int (e^{-x} + e^{2x})^2 dx = \int (e^{-2x} + 2e^x + e^{4x}) dx = -\frac{e^{-2x}}{2} + 2e^x + \frac{e^{4x}}{4} + C$
- 9) $\int \frac{(e^{3x} - 1)^2}{e^{4x}} dx = \int (e^x - e^{-2x})^2 dx = \dots = \frac{e^{2x}}{2} + 2e^{-x} - \frac{e^{-4x}}{4} + C$
- 10) $\int \frac{x}{5x^2 + 1} dx = \frac{1}{10} \int \frac{10x}{5x^2 + 1} dx = \frac{1}{10} \ln(5x^2 + 1) + C$
- 11) $\int \frac{5e^x}{2e^x + 1} dx = \frac{5}{2} \int \frac{2e^x}{2e^x + 1} dx = \frac{5}{2} \ln(2e^x + 1) + C$
- 12) $\int \frac{2x^2 + x - 7}{x + 1} dx = \int \left(2x - 1 - \frac{6}{x + 1}\right) dx = x^2 - x - 6\ln|x + 1| + C$
- 13) $\int \frac{x^3 - 2x^2 - 4}{2x - 1} dx = \int \left(\frac{x^2}{2} - \frac{3}{4}x - \frac{3}{8} - \frac{35}{8} \cdot \frac{1}{2x - 1}\right) dx = \frac{x^3}{6} - \frac{3}{8}x^2 - \frac{3}{8}x - \frac{35}{16} \cdot \ln|2x - 1| + C$
- 14) $\int \frac{x^2 + 2}{x + 1} dx = \frac{x^2}{2} - x + 3\ln|x + 1| + C$
- 15) $\int \frac{x^3 - 4x + 8}{2x - 3} dx = \int \left(\frac{x^2}{2} + \frac{3x}{4} - \frac{7}{8} + \frac{43}{8} \cdot \frac{1}{2x - 3}\right) dx = \frac{x^3}{6} + \frac{3}{8}x^2 - \frac{7}{8}x - \frac{43}{16} \cdot \ln|2x - 3| + C$
- 16) $\int \frac{x^2 - 4x + 4}{x + 2} dx = \frac{x^2}{2} - 6x - 16 \cdot \ln|x + 2| + C$
- 17) $\int \frac{2x + 1}{x^2 + x} dx = \ln|x^2 + x| + C$
- 18) $\int \frac{\sin x}{\cos x} dx = -\int \frac{-\sin x}{\cos x} dx = -\ln|\cos x| + C$

$$19) \int (31x+13)^{33} dx = \frac{1}{31} \int (31x+13)^{33} \cdot 31 dx = \frac{1}{31} \cdot \frac{(31x+13)^{34}}{34} + C = \frac{(31x+13)^{34}}{1054} + C$$

$$20) \int \frac{(2-x)^2 (x+2)^2 - x^4}{2x^5} dx = \int \frac{(x^2-4)^2 - x^4}{2x^5} dx = \frac{1}{2} \int \left(-\frac{8}{x^3} + \frac{16}{x^5} \right) dx = \frac{1}{2x^2} - \frac{2}{x^4} + C$$