

# INTEGRALI ELEMENTARI

FUNCTIONS	$f(x)$	$x^\alpha$	$k$	$e^x$	$e^{ax}$	$\sin x$	$\cos x$	$\frac{1}{x+\alpha}$
PRIMITIVES	$F(x)$	$\frac{x^{\alpha+1}}{\alpha+1}$	$k \cdot x$	$e^x$	$\frac{e^{ax}}{a}$	$-\cos x$	$\sin x$	$\ln(x+\alpha)$

PRIMI ESEMPI 1)  $\int (x^2 + e^x) dx = \int x^2 dx + \int e^x dx =$   
 $= \frac{x^{2+1}}{2+1} + e^x = \frac{x^3}{3} + e^x + C.$

2)  $\int (3x + e^{2x}) dx = \int 3x dx + \int e^{2x} dx =$   
 $= 3 \cdot \int x dx + \int e^{2x} dx = 3 \cdot \frac{x^2}{2} + \frac{e^{2x}}{2} + C = \frac{3x^2 + e^{2x}}{2} + C.$

3)  $\int_2^5 (x^3 - 1) dx = \left[ \frac{x^4}{4} - x \right]_2^5 = \frac{5^4}{4} - 5 - \left( \frac{2^4}{4} - 2 \right) =$   
 $= \frac{625}{4} - 5 - \frac{16}{4} + 2 = \frac{625}{4} - 7 = \frac{625 - 28}{4} = \frac{597}{4}.$

4)  $\int_4^8 \left( e^x + \frac{1}{x} \right) dx = \int_4^8 e^x dx + \int_4^8 \frac{1}{x} dx =$   
 $= \left[ e^x \right]_4^8 + \left[ \ln x \right]_4^8 = e^8 - e^4 + \ln 8 - \ln 4 =$   
 $= e^8 - e^4 + \ln \left( \frac{8}{4} \right) = e^8 - e^4 + \ln 2.$

PER CASA 1) (CALCOLARE i SEGUENTI INTEGRALI IMPERFINITI:

a)  $\int (x-3)^2 dx$ ; b)  $\int (e^x - e^{-x})^2 dx$ ; c)  $\int \frac{x^2 + 2x + 1}{4x} dx$ ;

d)  $\int \frac{x}{x+1} dx$  (SUGGERIMENTO:  $\int \frac{x}{x+1} dx = \int \frac{x+1-1}{x+1} dx = \int \frac{x+1}{x+1} dx - \int \frac{1}{x+1} dx$ )

2) (CALCOLARE i SEGUENTI INTEGRALI DEFINITI:

a)  $\int_2^3 (x^2 - e^{-3x}) dx$ ; b)  $\int_1^5 \left(1 + \frac{1}{x+1}\right) dx$ ; c)  $\int_0^{2\pi} (x + \sin x) dx$ ;

d)  $\int_0^3 (x + \sqrt[3]{x}) dx$ .