Ex 195/196/198/199/200 pag. 106

195 $\int t^3 e^{2t^4}\,dt$ $\left[\frac{1}{8}e^{2t^4}+c\right]$

BEFORE WE START...

Calcola i seguenti integrali indefiniti:

a. $\int x^2 e^{x^3}\,dx$ b. $\int \frac{e^{\tan x}}{\cos^2 x}\,dx$ c. $\int \frac{e^{\frac{2}{x}}}{x^2}\,dx$

Osserva che tutti gli integrali dati possono ricondursi alla forma $\int f'(x)\,e^{f(x)}\,dx$.

a. $\int x^2 e^{x^3}\,dx = \frac{1}{3}\int \underbrace{3x^2\, e^{x^3}}_{f'(x)\,e^{f(x)}}\,dx = \frac{1}{3}e^{\cdots} + c$

b. $\int \frac{e^{\tan x}}{\cos^2 x}\,dx = \int \underbrace{\frac{1}{\cos^2 x}}_{f'(x)}\underbrace{e^{\tan x}}_{e^{f(x)}}\,dx = \ldots\ldots + c$

c. $\int \frac{e^{\frac{2}{x}}}{x^2}\,dx = -\frac{1}{2}\int \underbrace{\frac{-2}{x^2}}_{f'(x)}\overbrace{e^{\frac{2}{x}}}^{e^{f(x)}}\,dx = \ldots\ldots + c$

→ ESEMPI

DERIVATA ✓

$\int t^3 e^{2t^4}$ → [ES. 195 P. 106]

$= \left[\int t^3\,dt\right] \cdot \int e^{(2t^4)}\,dt$ → $[u] = 2t^4$ (CAMBIO DI VARIABILE) (x)

$[du] = 2\cdot(4\,t^{4-1})\,dt \Rightarrow \underbrace{du = 8t^3\,dt}$

DERIVATA DI U (x)

PER SOSTITUIRE DU, CI SERVE TROVARE DT!

$\Rightarrow \frac{du}{8t^3} = \frac{\cancel{8t^3}\,dt}{\cancel{8t^3}}$ → $dt = \frac{1}{8}t^3\,du$

$= \left[\frac{t^4}{4}+c\right] \cdot \int e^{2t^4}\,dt$

u

$= \frac{t^4}{4}\cdot\left[\int \frac{1}{8}e^{u}\,du\right]$ ← RAGIONARE QUI

$= \frac{t^4}{4}\cdot\frac{1}{8}\int e^{u}\,du = \frac{t^4}{4}\cdot\frac{1}{8}e^{u} + c$

$u = 2t^4$ → $\left[\frac{t^4}{4}\cdot\frac{1}{8}e^{2t^4}\right]$

PER LA SOLUZIONE $\left[e^{f(x)} \cdot f'(x)\right] = e^{f(x)}$

$$= \frac{1}{8} e^{2t^4}$$

196 $\int \cos x \, e^{\sin x} \, dx$ $\quad [e^{\sin x} + c]$

$$\int \cos(x)\, e^{\sin(x)} \, dx \qquad \left[e^{f(x)} \cdot f'(x) = e^{f(x)}\right]$$

$\downarrow$

REGOLA

$$= \int e^{\sin(x)} \, dx \qquad \sin(x) \to u$$

$$u = \sin(x) \, dx$$

$$\frac{du}{\cos(x)} = \frac{\cancel{\cos(x)}\, dx}{\cancel{\cos(x)}} \quad \Rightarrow dx = \frac{1}{\cos(x)}$$

$$= \int e^u \, du$$