

Questões Seleccionadas de Integrais

1) $\int 5^{e^{+2x}} (2x^3 + 1) dx$

2) $\int \frac{e^{2x}}{e^x + 3} dx$

3) $\int \frac{e^{3x}}{(1 - 2e^{3x})^2} dx$

4) $\int \frac{2x^3}{x^2 - 4} dx$

5) $\int \frac{3r}{\sqrt{1-r^2}} dr$

6) $\int \sin^3 x \cos^5 x dx$

7) $\int_0^{\sqrt{e}} \frac{3x}{x^2 + 2} dx$

8) $\int_2^4 \frac{\ln x}{x} dx$

9) $\int \frac{x^2}{(x-1)^5} dx$

10) $\int \frac{x+4}{x^3 + 6x^2 + 11x + 6} dx$

11) $\int_0^{+\infty} x e^{-x^2} dx$

12) $\int_{-\infty}^{-1} \frac{dx}{x^2}$

13) $\int_0^1 x^2 \sqrt{1-x} dx$

14) $\int \frac{x e^x}{(1+x)^2} dx$

15) $\int \frac{x^2}{\sqrt{1-x^2}} dx$

Questões Resolvidas

1) $\int_{-\infty}^{\infty} |x| e^{-|x|} dx = 2 \int_0^{\infty} x e^{-2x} dx = 2 \left[-\frac{1}{2} \int_0^{\infty} e^u du \right] = -1 \left[\lim_{b \rightarrow \infty} e^{-2x|b} \right]_0 = -\lim_{b \rightarrow \infty} (e^{-2b} - e^0) = 1$

2) $\int_0^4 (x-2) e^{-(x-2)} dx \Leftrightarrow \int_{-2}^2 u e^{-u^2} du = \frac{-1}{2} \int_{-4}^4 e^o do = 0$

Impar Par

Questão 12 de 2001

Item 3.

$$\int_0^{\infty} \int_0^{\infty} (x+y) \cdot e^{-x-y} dx dy = 2?$$

$$\int_0^{\infty} \int_0^{\infty} t \cdot e^{-t} dt dy$$

$$\int t \cdot e^{-t} dt \left\{ \begin{array}{l} e^{-t} dt = dy \rightarrow v = \int e^{-t} = -e^{-t} \\ u = t \rightarrow du = dt \end{array} \right\}$$

$$\int u du = -e^{-t} t - \int -e^{-t} dt$$

$$\int u dv = -t e^{-t} + \int e^{-t} dt = -t e^{-t} - e^{-t} = e^{-t}(-t-1) = -e^{-t}(1+t)$$

$$\left\{ \begin{array}{l} dy = e^{-y} dy \Rightarrow v = -e^{-y} \\ u = 1+y \\ du = dy \end{array} \right.$$

$$\int (1+y) e^{-y} dy = -e^{-y}(1+y) + \int e^{-y} dy = -e^{-y}(1+y) - e^{-y} = -e^{-y}(2+y) = -\frac{2+y}{e^y} \Big|_0^{\infty} = 0 + \frac{2}{1} = 2$$

Item Verdadeiro