Martes, 19 de mayo

Pág. 351, 17 c, d, e, f, g, h

$$c)\ \int x\,2^{-x}\,dx = \left\{\begin{array}{l} u = x \quad \rightarrow \quad du = dx \\ dv = 2^{-x}\,dx \quad \rightarrow \quad v = \dfrac{-2^{-x}}{\ln 2} \end{array}\right\} = \frac{-x\,2^{-x}}{\ln 2} - \int \frac{-2^{-x}}{\ln 2}\,dx = \frac{-x\,2^{-x}}{\ln 2} + \frac{1}{Ln2}\int 2^{-x}\,dx = (*)$$

$$\int 2^{-x}\,dx = \{t = -x \quad \rightarrow \quad dt = -dx \quad \rightarrow \quad -dt = dx\} = \int -2^{t}\,dt = -\frac{2^{t}}{Ln2} = -\frac{2^{-x}}{Ln2}$$

$$(*) = \frac{-x\,2^{-x}}{\ln 2} + \frac{1}{Ln2}\left(-\frac{2^{-x}}{Ln2}\right) + C = \frac{-x\,2^{-x}}{\ln 2} - \frac{2^{-x}}{(Ln2)^2} + C$$

$$d)\ \int x^3 sen\ x\,dx = \left\{\begin{array}{l} u = x^3 \rightarrow du = 3x^2\ dx \\ dv = sen\ x\,dx \rightarrow v = -\cos x \end{array}\right\} = -x^3\ \cos x - \int -3x^2 \cos x\,dx =$$

$$= -x^3\ \cos x + 3\int x^2 \cos x\,dx = -x^3\ \cos x + 3\left(x^2 sen\ x + 2x\cos x - 2sen\ x\right) + C$$

$$\int x^2 \cos x\,dx = \left\{\begin{array}{l} u = x^2 \rightarrow du = 2x\,dx \\ dv = \cos x\,dx \rightarrow v = sen\ x \end{array}\right\} = x^2 sen\ x - \int 2x\ sen\ x\,dx = x^2 sen\ x - 2\int x\ sen\ x\,dx =$$

$$= x^2 sen\ x - 2(-x\cos x + sen\ x) = x^2 sen\ x + 2x\cos x - 2sen\ x$$

$$\int x\ sen\ x\,dx = \left\{\begin{array}{l} u = x \rightarrow du = dx \\ dv = sen\ x\,dx \rightarrow v = -\cos x \end{array}\right\} = -x\cos x - \int -\cos x\,dx = -x\cos x + \int \cos x\,dx =$$

$$= -x\cos x + sen\ x$$

$$e)\ \int \sqrt{(x+3)^5}\ dx = \int (x+3)^{\frac{5}{2}}\,dx = \frac{(x+3)^{\frac{5}{2}+1}}{\frac{5}{2}+1} + C = \frac{(x+3)^{\frac{7}{2}}}{\frac{7}{2}} + C = \frac{2}{7}\sqrt{(x+3)^7} + C$$

$$f)\ \int \frac{-3x}{2-6x^2}\,dx = \left\{\begin{array}{l} t = 2-6x^2 \\ dt = -12x\,dx; \quad dt = 4(-3x\,dx)) \end{array}\right\} = \int \frac{1}{t}\frac{dt}{4} = \frac{1}{4}\int \frac{dt}{t} = \frac{1}{4}Ln|t| + C = \frac{1}{4}Ln\left|2-6x^2\right| + C$$

$$g)\ \int e^{2x+1}\cos x\,dx = \left\{\begin{array}{l} u = e^{2x+1} \\ dv = \cos x\,dx \end{array}\right\}$$

$$h)\ \int x^5\ e^{-x^3}\ dx = \int x^3\ x^2\ e^{-x^3}\ dx = \left\{\begin{array}{l} u = x^3 \rightarrow du = 3x^2 dx \\ dv = x^2\ e^{-x^3} dx \quad \rightarrow \quad v = \int x^2\ e^{-x^3}\,dx = \dfrac{-1}{3}e^{-x^3} \end{array}\right\} =$$

$$= \frac{-x^3}{3}e^{-x^3} - \int -\frac{1}{3}3x^2 e^{-x^3}\,dx = \frac{-x^3}{3}e^{-x^3} + \int x^2 e^{-x^3}\,dx = \frac{-x^3}{3}e^{-x^3} - \frac{1}{3}e^{-x^3} + C$$

31)

$$F'(x) = \frac{1}{x^2} = x^{-2}, \quad ¿F \;/\; F(1) = 2?$$

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

$$F(1) = \frac{-1}{1} + C = 2; \quad -1 + C = 2; \quad C = 3$$

$$Solución: \quad F(x) = \frac{-1}{x} + 3$$

33)

$$f''(x) = 6x$$

$$f'(x) = \int 6x\,dx = 6\,\frac{x^2}{2} + C = 3x^2 + C$$

$$f(x) = \int \left(3x^2 + C\right) dx = 3\frac{x^3}{3} + C\,x + D = x^3 + C\,x + D$$

Como:

$$f'(0) = 1 \quad \rightarrow \quad 3 \cdot 0^2 + C = 1 \quad \rightarrow \quad C = 1$$

$$f(2) = 5 \quad \rightarrow \quad 2^3 + 2 + D = 5; \quad 10 + D = 5; \quad D = -5$$

$$Solución: \quad f(x) = x^3 + x - 5$$

54)

$$\int |2x-1|\,dx = \begin{cases} \quad si \quad x < \frac{1}{2} \\ x^2 - x + C \quad si \quad x \geq \frac{1}{2} \end{cases}$$

$$y = |2x-1| = \begin{cases} 2x-1 & si \quad 2x-1 \geq 0 \\ -2x+1 & si \quad 2x-1 < 0 \end{cases} = \begin{cases} 2x-1 & si \quad x \geq \frac{1}{2} \\ -2x+1 & si \quad x < \frac{1}{2} \end{cases}$$

$$\int (2x-1)dx = x^2 - x + C$$

$$\int (-2x+1)dx = -x^2 + x + K$$