Junio 20.

$$\int\left(\sqrt{x}\cdot\ln^2 x\right)dx = \frac{2}{3}x^{3/2}\ln^2 x - \int \frac{2}{3}x^{3/2}\cdot 2\ln x\cdot\frac{1}{x}\,dx =$$

$u=\ln^2 x \qquad 2\ln x\cdot\frac{1}{x}\,dx=du$

$\sqrt{x}\,dx=dv \qquad v=\frac{2}{3}x^{3/2}$

$$=\frac{2}{3}x^{3/2}\ln^2 x-\frac{4}{3}\int\sqrt{x}\ln x\,dx = \frac{2}{3}x^{3/2}\ln^2 x-\frac{4}{3}\cdot\frac{2}{3}x^{3/2}\ln x+\frac{4}{3}\int\frac{2}{3}\frac{x^{3/2}}{x}\,dx =$$

$u=\ln x \qquad du=\frac{1}{x}\,dx$

$\sqrt{x}\,dx=dv \qquad v=\frac{2}{3}x^{3/2}$

$$=\frac{2}{3}x^{3/2}\ln^2 x-\frac{4}{3}\cdot\frac{2}{3}x^{3/2}\ln x+\frac{8}{9}\int\sqrt{x}\,dx = \boxed{\frac{2}{3}x^{3/2}\left(\ln^2 x-\frac{4}{3}\ln x+\frac{8}{9}\right)+K}$$

Septiembre 20.

Calcule la siguiente integral $\int x^3 e^{x^2} dx = \frac{x^2 e^{x^2}}{2} - \int \frac{1}{2} e^{x^2} \cdot 2x\, dx =$

$u = x^2 \qquad du = 2x\, dx$

$x e^{x^2} dx = dv \qquad v = \frac{1}{2} e^{x^2}$

$$= \frac{x^2 \cdot e^{x^2}}{2} - \int x e^{x^2} dx = \frac{x^2 \cdot e^{x^2}}{2} - \frac{1}{2} e^{x^2} + K =$$

$$= \boxed{\frac{1}{2} e^{x^2} (x^2 - 1) + K}$$

Junio 21.

Calcule: $\int \frac{x^2-1}{x^3-3x+2}dx = \frac{1}{3}\int \frac{3x^2-3}{x^3-3x+2}dx = \frac{1}{3}\int \frac{du}{u} =$

$u = x^3-3x+2 \quad du = (3x^2-3)dx$

$= \frac{1}{3}\ln|u| + K = \frac{1}{3}\ln|x^3-3x+2| + K$

Junio 22.

Calcula: $\int e^{-x}\left(x^2-1\right)dx = -e^{-x}(x^2-1) + \int e^{-x}\,2x\,dx = -e^{-x}(x^2-1) + 2\int e^{-x}x\,dx =$

$u = x^2-1 \qquad du = 2x\,dx$

$e^{-x}dx = dv \qquad v = -e^{-x}$

$u = x \qquad du = dx$

$e^{-x}dx = dv \qquad v = -e^{-x}$

$= -e^{-x}(x^2-1) - 2xe^{-x} + 2\int e^{-x}dx = -e^{-x}(x^2-1) - 2xe^{-x} - 2e^{-x} + K$

$= -e^{-x}(x^2-1+2x+2) + K = \boxed{-e^{-x}(x^2+2x+1) + K}$

Septiembre 19.

Determine $\int x\left(\ln(x)\right)^2 dx$ $= \frac{x^2}{2}\ln^2 x - \int \frac{x^{\cancel{2}}}{\cancel{2}}\cancel{2}\frac{\ln x}{\cancel{x}}\,dx =$

$u = (\ln x)^2 \quad du = 2\ln x \cdot \frac{1}{x}dx$

$x\,dx = dv \quad v = \frac{x^2}{2}$

$u = \ln x \quad du = \frac{1}{x}dx$

$x\,dx = dv \quad v = \frac{x^2}{2}$

$$= \frac{x^2}{2}\ln^2 x - \frac{x^2}{2}\ln x + \frac{1}{2}\int \frac{x^{\cancel{2}}}{\cancel{x}}\,dx = \boxed{\frac{x^2}{2}\ln^2 x - \frac{x^2}{2}\ln x + \frac{x^2}{4} + C}$$

Junio 19.

Considere la función: $f(x)=\dfrac{x-1}{\underbrace{(x+1)^2}_{x^2+2x+1}}$ Determine la integral $\int_1^3 f(x)\,dx$

$$x^2+2x+1 \Rightarrow (x^2+2x+1) = 2x+2$$

$$\frac{x-1}{(x+1)^2} = \frac{A}{x+1} + \frac{B}{(x+1)^2}$$

$$x-1 = A(x+1) + B$$

$$x=-1 \Rightarrow \boxed{-2 = B}$$

$$x=0 \Rightarrow -1 = A+B$$

$$A=-1-B \Rightarrow \boxed{A=1}$$

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

$$= \ln|x+1| + \frac{2}{x+1} + K$$

$$\int_1^3 \frac{x-1}{(x+1)^2} = \left[\ln|x+1| + \frac{2}{x+1}\right]_1^3 =$$

$$= \ln\frac{4}{2} + \frac{2}{4} - \frac{2}{2} = \ln 2 - \frac{1}{2}$$

Junio 19.

$$\int \frac{1}{9-x^2}\,dx = \frac{1}{6}\int \frac{1}{3+x}\,dx + \frac{1}{6}\int \frac{1}{3-x}\,dx =$$

$$\frac{1}{(3+x)(3-x)} = \frac{A}{3+x} + \frac{B}{3-x}$$

$$= \frac{1}{6}\int \frac{1}{3+x}\,dx - \frac{1}{6}\int \frac{-1}{3-x}\,dx =$$

$$1 = A(3-x) + B(3+x)$$

$$= \frac{1}{6}\ln|3+x| - \frac{1}{6}\ln|3-x| + K$$

$x=3 \quad 1 = 6B \Rightarrow B = 1/6$

$x=-3 \quad 1 = 6A \Rightarrow A = 1/6$

$$\boxed{= \frac{1}{6}\ln\left|\frac{3+x}{3-x}\right| + K}$$