Sección 7.1 3, 5, 9, 10, 12, 15, 20, 24 y 31

3. $\int xcos(5x)dx = \frac{xsen(5x)}{5} - \frac{1}{5}\int sen(5x)\,dx = \frac{xsen(5x)}{5} + \frac{\cos(5x)}{25} + C$

$f = x$	$f' = 1dx$
$g = \frac{sen(5x)}{5}$	$g' = \cos(5x)$

5. $\int r.e^{\frac{r}{2}}dr = 2re^{\frac{r}{2}} - 2\int e^{\frac{r}{2}} = 2re^{\frac{r}{2}} - 4e^{\frac{r}{2}} + C$

$f = r$	$f' = 1dr$
$g = 2e^{\frac{r}{2}}$	$g' = e^{\frac{r}{2}}$

9. $\int \ln(2x+1)\,dx = \int \frac{\ln(u)}{2}du$

$u = 2x + 1$	$u' = 2dx$

$$= \frac{\ln|u|\,.\,u - \int u\frac{1}{u}du}{2} = \frac{\ln|u|\,u - u}{2} + C$$

$$= \frac{\ln|2x+1| \cdot (2x+1) - (2x+1)}{2} + C$$

$f = \ln(u)$	$f' = \frac{1}{u}du$
$g = u$	$g' = du$

10. $\int \text{sen}^{-1}(x)dx = \int \frac{1}{sen(x)}dx = \int \csc(x)\,dx =$

$$= ln|\sec(x) + tg(x)| + C$$

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$\int \sec v\, dv = \ln|\sec v + \tan v| + C$

12. $\int p^5.\ln(p)dp = \frac{p^6\ln(p)}{6} - \int \frac{p^6}{6p}dp = \frac{p^6\ln(p)}{6} - \frac{p^6}{36} + C$

$$f = ln(p) \qquad f' = \frac{1}{p}dp$$
$$g = \frac{p^6}{6} \qquad g' = p^5dp$$

15. $\int \ln^2 x\, dx = xln^2(x) - \int \frac{2\ln(x)}{x}xdx = xln^2(x) - 2xln(x) + 2x + C$

$$f = \ln^2(x) \qquad f' = \frac{2\ln(x)}{x}dx$$
$$g = x \qquad g' = dx$$

20. $\int_0^1 (x^2+1)\, e^{-x}dx = \int_0^1 \frac{x^2+1}{e^x}dx = \int_0^1 \frac{x^2}{e^x}dx + \int_0^1 \frac{1}{e^x}dx$

CA $\int \frac{1}{e^x}dx = \int e^{-x}dx = \int -e^u du = -e^u = -e^{-x}$

$$u = -x \qquad du = -dx$$

CA $\int \frac{x^2}{e^x}dx = -\frac{x^2}{e^x} + 2\int \frac{x}{e^x}dx = -\frac{x^2}{e^x} + 2\cdot\left[-\frac{x}{e^x} + \int \frac{1}{e^x}dx\right]$

$$f = x^2 \qquad f' = 2xdx \qquad\qquad f = x \qquad f' = dx$$
$$g = -\frac{1}{e^x} \qquad g' = \frac{1}{e^x}dx \qquad\qquad g = -\frac{1}{e^x} \qquad g' = \frac{1}{e^x}dx$$

$$\int_0^1 (x^2+1)\, e^{-x}dx = \int_0^1 \frac{x^2}{e^x}dx + \int_0^1 \frac{1}{e^x}dx$$
$$= \left[-\frac{x^2}{e^x} - \frac{2x}{e^x} - \frac{2}{e^x} - \frac{1}{e^x}\right]\begin{matrix}1\\0\end{matrix} = -\frac{6}{e} + 3$$

24. $\int_0^\pi x^3\cos(x)\, dx$

$$f = x^3 \qquad f' = 3x^2dx$$
$$g = sen(x) \qquad g' = \cos(x)\, dx$$

$$\int x^3\cos(x)\, dx = x^3sen(x) - 3\int x^2sen(x)dx$$

$$f = x^2 \qquad f' = 2xdx$$
$$g = -cos(x) \qquad g' = \mathrm{sen}(x)\, dx$$

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

$$\boxed{\begin{array}{cc} f = x & f' = dx \\ g = sen(x) & g' = \cos(x)\,dx \end{array}}$$

$$\int x^3 \cos(x)\,dx =$$

$$= x^3 sen(x) + 3x^2\cos(x) - 6\left[xsen(x) - \int sen(x)dx\right]$$

$$= x^3 sen(x) + 3x^2\cos(x) - 6xsen(x) + 6cos(x) + c$$

$$\int_0^{\pi} x^3 \cos(x)\,dx = [x^3 sen(x) + 3x^2\cos(x) - 6xsen(x) + 6cos(x)]_0^{\pi}$$

$$= -3\pi^2 + 12$$

31. $\int_1^2 x^4 \ln^2(x)\,dx$

$$\boxed{\begin{array}{cc} f = \ln^2(x) & f' = \dfrac{2\ln(x)}{x}dx \\ g = \dfrac{x^5}{5} & g' = \mathrm{x}^4 dx \end{array}}$$

$$\int x^4 \ln^2(x)\,dx = \frac{x^5\ln^2(x)}{5} - \int \frac{x^5 2\ln(x)}{5x}dx$$

$$\int x^4 \ln^2(x)\,dx = \frac{x^5\ln^2(x)}{5} - \frac{2}{5}\int x^4 \ln(x)\,dx$$

$$\boxed{\begin{array}{cc} f = \ln(x) & f' = \dfrac{1}{x}dx \\ g = \dfrac{x^5}{5} & g' = \mathrm{x}^4 dx \end{array}}$$

$$\int x^4 \ln^2(x)\,dx = \frac{x^5\ln^2(x)}{5} - \frac{2}{5}\left[\frac{x^5\ln(x)}{5} - \int \frac{x^5}{5x}dx\right]$$

$$= \frac{x^5\ln^2(x)}{5} - \frac{2x^5\ln(x)}{25} + \frac{2x^5}{125} + C$$

$$\int_1^2 x^4 \ln^2(x)\,dx = \left[\frac{x^5\ln^2(x)}{5} - \frac{2x^5\ln(x)}{25} + \frac{2x^5}{125}\right]_1^2 \cong 1{,}79\ldots$$