Integration by parts

1.– Integrate the following functions:

a) $\displaystyle\int \arctan x \; dx$

b) $\displaystyle\int x \; \arctan x \; dx$

c) $\displaystyle\int \sin 2x \; e^{\sin x} \; dx$

d) $\displaystyle\int \cos^2 x \; dx$

e) $\displaystyle\int \frac{x \; \arcsin x}{\sqrt{1-x^2}} \; dx$

f) $\displaystyle\int \arcsin^2 x \; dx$

g) $\displaystyle\int \arcsin x \; dx$

h) $\displaystyle\int x^2 \; \ln x \; dx$

i) $\displaystyle\int x^3 e^{x^2} \; dx$

j) $\displaystyle\int \frac{\ln x}{x^3} \; dx$

k) $\displaystyle\int \frac{\arctan x}{x^2(1+x^2)} \; dx$

l) $\displaystyle\int \ln\left(x+\sqrt{1+x^2}\right) \; dx$

2.– Obtain the primitives of the following functions:

a) $\displaystyle\int \frac{\ln x}{\sqrt{x}} \; dx$

b) $\displaystyle\int \frac{x}{\cos^2 x} \; dx$

c) $\displaystyle\int \ln^2 x \; dx$

d) $\displaystyle\int \arcsin\sqrt{\frac{x}{1+x}} \; dx$

e) $\displaystyle\int \sqrt{1-x^2} \; dx$

f) $\displaystyle\int e^x \, \frac{x-1}{x^2} \; dx$

g) $\displaystyle\int \sin^2 x \; dx$

h) $\displaystyle\int e^{\sin x} \, \frac{x\cos^3 x - \sin x}{\cos^2 x} \; dx$

i) $\displaystyle\int x \; \arcsin x \; dx$

j) $\displaystyle\int \cos x \ln(1+\sin x) \; dx$

k) $\displaystyle\int \frac{\arcsin x}{(1-x^2)^{3/2}} \; dx$

l) $\displaystyle\int x^2 \arcsin x \; dx$

3.– Solve the following integrales:

a) $\displaystyle\int \frac{x\cos x}{\sin^2 x}\,dx$

b) $\displaystyle\int \frac{x}{\sin^2 x}\,dx$

c) $\displaystyle\int \sin\ln x\,dx$

d) $\displaystyle\int e^{\sqrt{x}}\,dx$

e) $\displaystyle\int \frac{\arcsin\sqrt{x}}{\sqrt{1-x}}\,dx$

f) $\displaystyle\int x\ln\left(\frac{1-x}{1+x}\right)\,dx$

g) $\displaystyle\int \cos^2\ln x\,dx$

h) $\displaystyle\int \frac{\sin^2 x}{e^x}\,dx$

i) $\displaystyle\int \frac{\arcsin x}{x^2}\,dx$

j) $\displaystyle\int x\tan^2 2x\,dx$

k) $\displaystyle\int \arccos\frac{1}{x}\,dx$

l) $\displaystyle\int \sinh x\ln\left(\cosh^2 x\right)\,dx$

4.– Integrate the following functions:

a) $\displaystyle\int e^x\,\frac{1+\sin x}{1+\cos x}\,dx$

b) $\displaystyle\int x^3\cos x\,dx$

c) $\displaystyle\int e^x\,\frac{1+x^2}{(1+x)^2}\,dx$

d) $\displaystyle\int x^3\arcsin\frac{1}{x}\,dx$

e) $\displaystyle\int \left(\frac{\ln x}{x}\right)^2\,dx$

f) $\displaystyle\int \sqrt{x}\,\ln^2 x\,dx$

g) $\displaystyle\int x^2\arccos x\,dx$

h) $\displaystyle\int \arctan\sqrt{x}\,dx$

i) $\displaystyle\int \sin x\,\ln(\tan x)\,dx$

j) $\displaystyle\int x\,\arctan^2 x\,dx$

k) $\displaystyle\int \sqrt{x}\,\sin\sqrt{x}\,dx$

l) $\displaystyle\int \frac{x\,e^{\arctan x}}{(1+x^2)^{3/2}}\,dx$
