8.2 Integration by parts

Thm. If u and v are differentiable functions of x, then

$$\int u\,dv = uv - \int v\,du$$

(ultraviolet voodoo)

In general, let u be the first function you find in "LIATE":

Logarithmic
Inverse Trigonometric
Algebraic
Trigonometric
Exponential

Kick back at Starbuck's with a "LIATE".

or, some people prefer "LIPET":

Logarithmic
Inverse Trigonometric
Polynomial
Exponential
Trigonometric

ex. $\int x^2 \ln x \, dx$

ex. $\int \arcsin x \ dx$

ex. $\int e^x \sin x \, dx$

ex. $\int \sec^3 x \, dx$

ex. $\int x^2 e^x \, dx$

ex. $\int x^2 \sin 4x \, dx$

ex. If $\int f(x)\sin x \ dx = -f(x)\cos x + \int 3x^2 \cos x \ dx$

What could f(x) be?