Additional Integration 6

What acronym do you use to help decide your u- when using Integration by Parts? When do you use Integration by Parts?

I - Inverse Trig.
L - Log
A - Algebra
T - Trig.
E - Exponential

} This is your u- in integration by parts

- Use for multiplication or division of integration.

Additional Integration 7

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

$\int x^2 e^x \, dx$ $\quad u = x^2 \quad v = e^x$

$du = 2x\,dx \quad dv = e^x dx$

$x^2 e^x - \int 2x e^x \, dx$

$x^2 e^x - 2\int x e^x \, dx$ $\quad u = x \quad v = e^x$

$du = dx \quad dv = e^x dx$

$x^2 e^x - 2\left[x e^x - \int e^x \, dx\right]$

$x^2 e^x - 2x e^x + 2e^x + C$

Additional Integration 8

$\int x \ln x \, dx$

$\int x \ln x \, dx$

- No choice.... Inverse Trig & ln's must be u

$\frac{1}{2}x^2 \ln x - \int \frac{1}{2}x^2 \left(\frac{1}{x}dx\right)$ $\quad u = \ln x \quad v = \frac{1}{2}x^2$

$du = \frac{1}{x}dx \quad dv = x\,dx$

$\frac{1}{2}x^2 \ln x - \frac{1}{2}\int x \, dx$

$\frac{1}{2}x^2 \ln x - \frac{1}{2}\frac{x^2}{2} + C$

$\frac{1}{2}x^2 \ln x - \frac{1}{4}x^2 + C$

Additional Integration 9

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

Revolving ☺ ☺ ☺

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

$u = \sin x \quad v = e^x$

$du = \cos x \, dx \quad dv = e^x \, dx$

$e^x \sin x - \int e^x \cos x \, dx$

$u = \cos x \quad v = e^x$

$du = -\sin x \, dx \quad dv = e^x \, dx$

$e^x \sin x - [e^x \cos x - \int -\sin x \, e^x \, dx$

$e^x \sin x - e^x \cos x - \int e^x \sin x \, dx = \int e^x \sin x \, dx$

$+ \int e^x \sin x \, dx + \int e^x \sin x \, dx$

$e^x \sin x - e^x \cos x = 2 \int e^x \sin x \, dx$

$\frac{1}{2}[e^x \sin x - e^x \cos x] + C$