I.B.P

4. $\int xe^{-x}dx$ $\quad u = x \quad dv = e^{-x}dx$

$du = dx \quad v = -e^{-x}$

$= xe^{-x} + \int e^{-x}dx = \underline{-xe^{-x} - e^{-x} + C}$

6. $\int t\sin 2t\,dt$ $\quad u = t \quad dv = \sin 2t\,dt$

$du = dt \quad v = \underline{\frac{-\cos(2t)}{2}}$

$= -\frac{1}{2}t\cos(2t) + \underline{\frac{1}{2}\int \cos(2t)dt}$

use u-sub if you don't know this.

$\int \cos(2t)dt \quad u = 2t$

$du = 2dt$, so $dt = \frac{du}{2}$

$= \frac{1}{2}\int \cos(u)du$

$= 1/2\ (\sin(u)) = 1/2\sin(2t) + C$

$= \underline{-\frac{1}{2}t\cos(2t) + \frac{1}{4}\sin(2t)}$

12. $\int \arcsin(x)dx$ $\quad u = \arcsin(x) \quad dv = dx$

$du = \frac{1}{\sqrt{1-x^2}}dx \quad v = x$

$= x\arcsin(x) - \int \frac{x}{\sqrt{1-x^2}}dx$ ← must use u-sub.

$u = 1 - x^2$

$du = -2x\,dx$, so $dx = \frac{du}{-2x}$

$\int \frac{x}{\sqrt{1-x^2}}dx = -\frac{1}{2}\int \frac{1}{\sqrt{u}}du = -\sqrt{u} + C$

$= -\sqrt{1-x^2} + C$

$= x\arcsin(x) + \sqrt{1-x^2} + C$

I. B. P. cont

16. $\int_0^1 (x^2+1)e^{-x}dx$

$u = x^2+1$ $\quad dv = e^{-x}dx$

$du = 2x\,dx$ $\quad v = -e^{-x}$

1) Find $\int (x^2+1)e^{-x}dx$

$= -e^{-x}(x^2+1) + 2\int xe^{-x}dx$ I.B.P again

$u = x \quad dv = e^{-x}dx$

$du = dx \quad v = -e^{-x}$

$-xe^{-x} + \int e^{-x}dx = -xe^{-x} - e^{-x} + C$

$= -e^{-x}(x^2+1) - 2xe^{-x} - 2e^{-x} + C$

$= -e^{-x}(x^2+2x+3) + C$

2) Use FTC

$\int_0^1 (x^2+1)e^{-x}dx = -e^{-1}(1^2+2+3) + e^{-0}(0^2+0+3)$

$= -6e^{-1} + 3$

26. $\int t^3 e^{-t^2}dt$ $\quad u = t^2$

$du = 2t\,dt$, so $dt = \frac{du}{2t}$

$= \frac{1}{2}\int u e^{-u}du$ from #4 we know this is

$= \frac{1}{2}(-ue^{-u} - e^{-u}) + C = \frac{1}{2}(-t^2e^{-t^2} - e^{-t^2}) + C$

IBP con't.

34. $\int x^2 \sin(2x)\,dx$ $\quad u = x^2$ $\quad dv = \sin(2x)\,dx$

$du = 2x\,dx$ $\quad v = \frac{-\cos(2x)}{2}$

$$= \frac{-x^2\cos(2x)}{2} + \int x\cos(2x)$$

I.B.P again $\quad u = x$ $\quad dv = \cos(2x)\,dx$

$du = dx$ $\quad v = \frac{\sin(2x)}{2}$

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

$$= \frac{-x^2\cos(2x)}{2} + \frac{x\sin(2x)}{2} + \frac{\cos(2x)}{4} + C$$