Sample of hand-writing notes taken with EASY NOTE TAKERS during lecture of ZCA 110, Sem I, sessi 08/0

A

$$\int \underbrace{x^2}_{u} \underbrace{e^x dx}_{dv}$$

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

B

$$\int \underbrace{e^x}_{u} \underbrace{x^2 dx}_{dv}$$

$$\underbrace{u,\ dv}_{?}$$

$$\int u\,dv = uv - \int v\,du \quad ; \quad u = e^x \rightarrow du = e^x dx$$

$$dv = x^2 dx$$

$$= e^x\left(\frac{x^3}{3}\right) - \int \frac{x^3}{3} \cdot e^x dx$$

$$\int dv = v = \int x^2 dx$$

$$v = \frac{x^3}{3}$$

$$\int \underbrace{e^x}_{u} \underbrace{x^2 dx}_{dv} = \frac{1}{3} e^x x^3 - \frac{1}{3}\int x^3 e^x dx$$

B

=

A

$$\int \underbrace{x^2}_{u} \underbrace{e^x\,dx}_{dv}$$

B

$$\int \underbrace{e^x}_{u} \underbrace{x^2\,dx}_{dv}$$

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

$$\underbrace{u,\ dv}_{?}$$

$$\int u\,dv = uv - \int v\,du \ ; \quad u = e^x \to du = e^x\,dx$$

$$dv = x^2\,dx$$

$$= e^x\left(\frac{x^3}{3}\right)$$

$$\int dv = v = \int x^2\,dx$$

$$-\int \frac{x^3}{3}\,(e^x\,dx)$$

$$v = \frac{x^3}{3}$$

$$\int \underbrace{e^x}_{u} \underbrace{x^2\,dx}_{dv} = \frac{1}{3} e^x x^3 - \frac{1}{3}\int x^3 e^x\,dx$$

$$= B$$

$$\int \underbrace{x^2}_{u}\ \underbrace{e^x dx}_{dv} \neq \int \underbrace{e^x}_{u}\ \underbrace{x^2 dx}_{dv}$$

$$= \int u\,dv$$

$$u = x^2 \rightarrow du = 2x\,dx$$

$$dv = e^x dx$$

$$\int dv = e^x = v$$

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

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

$$\int \underbrace{x^2}_{u}\ \underbrace{e^x dx}_{dv} = x^2 e^x - 2\int x e^x dx$$

$$\int \underbrace{x}_{p}\ \underbrace{e^x dx}_{dq} = \int p\,dq = pq - \int q\,dp$$

$$p = x \rightarrow dp = dx$$

$$dq = e^x dx$$

$$q = e^x$$

$$= x \cdot e^x - \int e^x \cdot dx$$

$$= x e^x - e^x$$

$$\int x^2 e^x dx = x^2 e^x - 2(x e^x - e^x) + c$$

$$= x^2 e^x + 2e^x - 2x e^x + c$$

$$\int \underbrace{e^x}_{u} \underbrace{\sin x\, dx}_{dv}$$

$u = e^x$; $du = e^x dx$

$dv = \sin x\, dx$

$v = -\cos x$

$$\int \underbrace{e^x}_{u} \underbrace{\cos x\, dx}_{dv}$$

$dv = \cos x\, dx$

$v = \sin x$

$$= uv - \int v\, du = e^x \cdot \sin x - \int \sin x \cdot e^x\, dx$$

$$= e^x \sin x - \left[-e^x \cos x + \int e^x \cos x\, dx \right]$$

$$uv - \int v\, du$$

$$-e^x \cdot \cos x + \int \cos x \cdot e^x\, dx$$

$$\int e^x \cos x\, dx.$$

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

$$2\int e^x \cos x\, dx = e^x (\cos x + \sin x)$$

$$\frac{e^x(\cos x + \sin x)}{2} + C.$$

$$\int \underbrace{x}_{u} \underbrace{e^{-x}\,dx}_{dv}$$

$u = x \rightarrow du = dx$

$dv = e^{-x}dx$

$\downarrow$

$v = -e^{-x}$

$$= x \cdot (-e^{-x}) - \int -e^{-x} \cdot dx$$

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

$$\frac{d}{dx}\left((xe^{-x}) - e^{-x}\right) = \qquad = xe^{-x}?$$

$$\cancel{e^{-x} - xe^{-x} + e^{-x}}$$

$$\frac{d}{dx}\left(xe^{-x} - e^{-x}\right)$$

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

$$= 2e^{-x} - xe^{-x}$$

$$\int f(x) \cdot h(x)\, dx = \cancel{f'(x)} \int$$

$$= f'(x) \cdot h(x) - \int \left\{ f'(x) \cdot \left(\int h(x) dx \right) \right\} dx$$

$$\int \underset{\uparrow}{e^x} \underbrace{\cos x}_{h(x)} \, dx = e^x \cdot \cos x - \int \left\{ (e^x)(\sin x) \right\} dx$$

$f(x) = e^x$

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

$f'(x) = e^x$

$\int h(x) dx = \int \cos x \, dx$

$= \sin x$

$(e^x)' = e^x$

$\int e^x dx = e^x$

$(\sin x)' = \cos x$

$\int \sin x \, dx = \cos x$

$h(x)$

$f(x) = e^x$

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

$f(x) = e^x \quad \int \cancel{x^2 e^x}$

$h(x) = x$

$\int h(x) dx = \dfrac{x^2}{2}$

$f(x) = e^x$

$$= f'(x) \cdot h(x) - \int \left(f(x) \cdot \int h(x) dx \right) dx$$

$$= e^x \cdot x - \int e^x \cdot \frac{x^2}{2} dx$$