$$\int \cos^3 x \sin^2 x dx = \int \sin^2 x\left(1-\sin^2 x\right)\cos x\, dx$$

$$= \int t^2\left(1-t^2\right)dt = \frac{t^3}{3} - \frac{t^5}{5} + c$$

$$= -\frac{1}{5}\sin^5 x + \frac{1}{3}\sin^3 x + c$$

$$4)\int \frac{1}{x^2+4}dx = \frac{1}{4}\int\left(\frac{1}{\left(\frac{x}{2}\right)^2+1}\right)dx = \frac{1}{2}\arctan\left(\frac{x}{2}\right)+c$$

$$5)\int \frac{\left(\arctan^3 x\right)}{1+x^2}dx = \int t^3 dt \quad , \left(\begin{array}{l} t=\arctan x \\ dt = \dfrac{dx}{1+x^2} \end{array}\right)$$

$$= \frac{t^4}{4}+c = \frac{\arctan^4 x}{4}+c.$$

$$6)\int \frac{1}{1+e^x}dx = \int\left(1-\frac{e^x}{1+e^x}\right)dx = x - \ln\left(1+e^x\right)+c.$$

<u>التمرين الثلث</u>

مكاملة بالتجزئة: $\left[\int uv' = uv - \int u'v\right]$

$$1)\int(\arctan x)dx = x\arctan x - \int \frac{x}{1+x^2}dx$$

$$= x\arctan x - \frac{1}{2}\ln\left(1+x^2\right)+c \quad , \left(\begin{array}{l} u=\arctan x, v'=1 \\ u' = \dfrac{1}{1+x^2}, v=x \end{array}\right)$$

$$2)\int x\ln x\, dx = \frac{x^2}{2}\ln x - \frac{x^2}{4}+c \quad , \left(\begin{array}{l} u=\ln x, \quad v'=x \\ u'=\dfrac{1}{x} \quad , v=\dfrac{x^2}{2} \end{array}\right)$$