② $\cos^4 x \sin^3 x \, dx \Rightarrow \int \cos^4 x \cdot \sin x \cdot \sin^2 x \, dx$

$= \int \cos^4 x \, (1-\cos^2 x) \sin x \, dx$

$u = \cos x$

$dx = \frac{-du}{\sin x}$

$\int \cos^4 x \, (1-\cos^2 x) \cancel{\sin x} \cdot \frac{-du}{\cancel{\sin x}} = -\int \cos^4 x \, (1-\cos^2 x) \, du$

$$\int u^4 (u^2 - 1)\, du = \int (u^6 - u^4)\, du$$

$$= \int \Big[\Big(\frac{u^7}{7} - \frac{u^5}{5} \Big) + C = \frac{(\cos x)^7}{7} - \frac{(\cos x)^5}{5} + C$$

(3) $\cos x \sin^3 x \, dx$

m is odd so $= u = \cos x$, $u^2 = \cos^2 x$ $\quad dx = \frac{-du}{\sin x}$

$\sin^2 x + \cos^2 x = 1$ and $\cos^2 x = 1 - \sin^2 x$ and $\sin^2 x = 1 - \cos^2 x$

$$\int \cos x \cdot \cancel{\sin x} \cdot \sin^2 x \cdot u^{*} \cdot \frac{-du}{\cancel{\sin x}}$$

$$= \int \cancel{\cos x} \cdot \sin^2 x \cdot u^{*} \cdot -du = -\int (1 - \cos^2 x) u \, du$$

$$-\int (u^2 - 1) u \, du = (u^3 - u) \, du \Rightarrow \int \left[\frac{u^4}{4} - \frac{u^2}{2} \right] + c$$

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