Example: Integrate.

1.) $\int \cos x \cdot \sin^3 x \, dx$ (Let $u = \sin x$ $\xrightarrow{D}$ $du = \cos x \, dx$)

$= \int u^3 \, du = \frac{1}{4}u^4 + C = \frac{1}{4}(\sin x)^4 + C$

2.) $\int (\cos 2x + \sec^2 x) \, dx$

$= \frac{1}{2}\sin 2x + \tan x + C$

3.) $\int (\sec x \tan x + \underline{\tan^2 x}) \, dx$

$= \int (\sec x \tan x + (\sec^2 x - 1)) \, dx$

$= \sec x + \tan x - x + C$

4.) $\int (\sin 3x - \cos 3x)^2 \, dx$

$= \int (\underline{\sin^2 3x} - 2\sin 3x \cos 3x + \underline{\cos^2 3x}) \, dx$

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

$= x - 2\int \sin 3x \cos 3x \, dx$

(Let $u = \sin 3x \xrightarrow{D} \cdots$)

$= x - \frac{1}{3}\sin^2 3x + C$