



$$\begin{aligned} & \int f(\sin x, \cos x) dx \\ &= \int f(\sin x) \cos x dx = \int f(u) du, u = \sin x \end{aligned}$$

$$\begin{aligned} & \int f(\sec x, \tan x) dx \\ &= \int f(\cos x) \sin x dx = - \int f(u) du, u = \cos x \end{aligned}$$

$$\begin{aligned} & \int f(\csc x, \cot x) dx \\ &= \int \cos^5 x \sin^3 x dx = \int \cos^5 x \sin^2 x \sin x dx \\ &= \int \cos^5 x (1 - \cos^2 x) \sin x dx \\ &= - \int u^5 (1 - u^2) du, u = \cos x \\ &= -\frac{u^6}{6} + \frac{u^8}{8} + c \end{aligned}$$

$$\int f(\tan x) \sec^2 x dx = \int f(u) du, u = \tan x$$

$$\int f(\sec x) \sec x \tan x dx = \int f(u) du, u = \sec x$$

$$\begin{aligned} & \int \sec^4 x dx = \int \sec^2 x \sec^2 x dx \\ &= \int (1 + \tan^2 x) \sec^2 x dx \\ &= \int (1 + u^2) du = u + \frac{u^3}{3} + c, u = \tan x \end{aligned}$$

$$\int \sec x dx = \ln \sec x + \tan x + c$$

$$I = \int \sec^3 x dx = uv - \int v du$$

Through IBP:  $u = \sec x, du = \sec x \tan x dx, v = \tan x, dv = \sec^2 x dx$

$$\begin{aligned} &= \int \sec x \tan x - \int \sec x \tan^2 x dx \\ &= \int \sec x \tan x - \int \sec x (\sec^2 x - 1) dx \\ &= \int \sec x \tan x - \int \sec^3 x dx - \int \sec x dx \\ &= \int \sec x \tan x + \int \sec x dx - I \end{aligned}$$