Recipes For Trigonometric Product Integrals

A. Guidelines for $\int \sin^m x \cos^n x \, dx$

(1) **If m is ODD**
- (a) separate a $\sin x \, dx$
- (b) substitute remaining $\sin^2 x$ with $\sin^2 x = 1 - \cos^2 x$
- (c) choose $u = \cos x$ and $du = -\sin x \, dx$

(2) **If n is ODD**
- (a) separate a $\cos x \, dx$
- (b) substitute remaining $\cos^2 x$ with $\cos^2 x = 1 - \sin^2 x$
- (c) choose $u = \sin x$ and $du = \cos x \, dx$

(3) **If m and n are both EVEN**
- (a) Use $\sin^2 x = \frac{1}{2}(1 - \cos 2x)$ or $\cos^2 x = \frac{1}{2}(1 + \cos 2x)$ to reduce the powers by $\frac{1}{2}$

B. Guidelines for $\int \tan^m x \sec^n x \, dx$

(1) **If m is ODD**
- (a) separate a $\sec x \tan x \, dx$
- (b) substitute remaining $\tan^2 x$ with $\tan^2 x = \sec^2 x - 1$
- (c) choose $u = \sec x$ and $du = \sec x \tan x \, dx$

(2) **If n is EVEN**
- (a) separate a $\sec^2 x \, dx$
- (b) substitute remaining $\sec^2 x$ with $\sec^2 x = 1 + \tan^2 x$
- (c) choose $u = \tan x$ and $du = \sec^2 x \, dx$

(3) **If m is EVEN and n is ODD**
- (a) Tough call, Integrate by Parts?

C. Guidelines for $\int \cot^m x \csc^n x \, dx$

(1) **If m is ODD**
- (a) separate a $\csc x \cot x \, dx$
- (b) substitute remaining $\cot^2 x$ with $\cot^2 x = \csc^2 x - 1$
- (c) choose $u = \csc x$ and $du = -\csc x \cot x \, dx$

(2) **If n is EVEN**
- (a) separate a $\csc^2 x \, dx$
- (b) substitute remaining $\csc^2 x$ with $\csc^2 x = 1 + \cot^2 x$
- (c) choose $u = \cot x$ and $du = -\csc^2 x \, dx$

(3) **If m is EVEN and n is ODD**
- (a) Tough call, Integrate by Parts?