

Section 28.4: Basic Trig Forms

January-13-17
2:31 PM

Weekly mini-quiz:

one question

five minutes long

First mini-quiz this coming Wednesday,
and then every Wed thereafter

from the derivatives of the six trig functions,
we find that

$$\left. \begin{aligned} \int \sin u \, du &= -\cos u + C \\ \int \cos u \, du &= \sin u + C \end{aligned} \right\} \text{you must know!}$$

$$\left. \begin{aligned} \int \sec^2 u \, du &= \tan u + C \\ \int \csc^2 u \, du &= -\cot u + C \\ \int \sec u \tan u \, du &= \sec u + C \\ \int \csc u \cot u \, du &= -\csc u + C \end{aligned} \right\} \text{formulas sheet}$$

examples:

$$\textcircled{1} \int 2 \csc^2 5\theta \, d\theta$$

$$\left. \begin{aligned} \text{let } u &= 5\theta \\ du &= 5 \, d\theta \\ \frac{du}{5} &= d\theta \end{aligned} \right\}$$

$$= -\frac{2}{5} \cot 5\theta + C$$

$$\begin{aligned} \textcircled{2} \quad & \int e^x \sec e^x \tan e^x dx && \left. \begin{array}{l} \text{let } u = e^x \\ du = e^x dx \end{array} \right\} \\ &= \int \sec e^x \tan e^x e^x dx \\ &= \int \sec u \tan u du \\ &= \sec u + C \\ &= \sec e^x + C \end{aligned}$$

note: $\int \tan x dx$ & $\int \cot x dx$ on formula sheet

$$\begin{aligned} \textcircled{3} \quad & \int \cot \frac{\theta}{2} d\theta && \left. \begin{array}{l} \text{let } u = \theta/2 \\ du = 1/2 d\theta \\ 2du = d\theta \end{array} \right\} \\ &= 2 \ln \left| \sin \frac{\theta}{2} \right| + C \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad & \int \frac{3 dx}{\cos 2x} \\ &= \int 3 \sec 2x dx \end{aligned}$$

$$= \frac{3}{2} \ln |\sec 2x + \tan 2x| + C$$

$$\begin{aligned} \textcircled{5} \quad & \int \frac{1 + \sec^2 x}{x + \tan x} dx && \left. \begin{array}{l} \text{let } u = x + \tan x \\ du = (1 + \sec^2 x) dx \end{array} \right\} \\ &= \int \frac{du}{u} \\ &= \ln |u| + C \\ &= \ln |x + \tan x| + C \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad & \int (1 + \sec x)^2 dx \\ &= \int (1 + 2\sec x + \sec^2 x) dx \\ &= x + 2 \ln |\sec x + \tan x| \\ &\quad + \tan x + C \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad & \int 5 \tan \theta \ln(\cos \theta) d\theta && \left. \begin{array}{l} \text{let } u = \ln(\cos \theta) \\ du = -\tan \theta d\theta \end{array} \right\} \\ &= \int -5 u du \end{aligned}$$

$$= -\frac{5}{2} u^2 + C$$

$$= -\frac{5}{2} [\ln(\cos \theta)]^2 + C$$

$$\textcircled{8} \quad \int \frac{\tan e^{-x}}{e^x} dx$$

$$\left[\begin{array}{l} \text{let } u = e^{-x} \\ du = -e^{-x} dx \\ -du = e^{-x} dx \end{array} \right]$$

$$= \int (\tan e^{-x})(e^{-x} dx)$$

$$= \int -\tan u \, du$$

$$= + \ln |\cos u| + C$$

$$= \ln |\cos e^{-x}| + C$$