Section 28.4: Basic Trig Forms

January-13-17
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Weekly mini-quiz:

one question

five minutes long

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

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

$$\int \sin u \, du = -\cos u + C$$
$$\int \cos u \, du = \sin u + C$$

} you must know!

$$\int \sec^2 u \, du = \tan u + C$$
$$\int \csc^2 u \, du = -\cot u + C$$
$$\int \sec u \tan u \, du = \sec u + C$$
$$\int \csc u \cot u \, du = -\csc u + C$$

} formula sheet

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examples:

① $\int 2 \csc^2 5\theta \, d\theta$

let $u = 5\theta$
$du = 5 \, d\theta$
$\frac{du}{5} = d\theta$

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

② $\int e^x \sec e^x \tan e^x \, dx$

let $u = e^x$
$du = e^x dx$

$$= \int \sec e^x \tan e^x \, e^x dx$$

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

$$= \sec u + C$$

$$= \sec e^x + C$$

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

③ $\int \cot \frac{\theta}{2} \, d\theta$

let $u = \theta/2$
$du = \frac{1}{2} d\theta$
$2du = d\theta$

$$= 2 \ln \left| \sin \frac{\theta}{2} \right| + C$$

④ $\int \frac{3 \, dx}{\cos 2x}$

$$= \int 3 \sec 2x \, dx$$

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

(5) $\int \frac{1 + \sec^2 x}{x + \tan x} \, dx$

let $u = x + \tan x$

$du = (1 + \sec^2 x) \, dx$

$$= \int \frac{du}{u}$$

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

$$= \ln |x + \tan x| + C$$

(6) $\int (1 + \sec x)^2 \, dx$

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

$$= x + 2 \ln |\sec x + \tan x| + \tan x + C$$

(7) $\int 5 \tan \theta \ln(\cos \theta) \, d\theta$

let $u = \ln(\cos \theta)$

$du = -\tan \theta \, d\theta$

$$= \int -5u \, du$$

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

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

(8) $$\int \frac{\tan e^{-x}}{e^x}\,dx$$

let $u = e^{-x}$
$du = -e^{-x}\,dx$
$-du = e^{-x}\,dx$

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

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

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

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