Math 21B
Kouba
Trig Identities and Antiderivatives

You need NOT memorize identities number 1.) through 4.).

1.) $\sin(A+B) = \sin A \ \cos B + \cos A \ \sin B$
2.) $\sin(A-B) = \sin A \ \cos B - \cos A \ \sin B$

3.) $\cos(A+B) = \cos A \ \cos B - \sin A \ \sin B$
4.) $\cos(A-B) = \cos A \ \cos B + \sin A \ \sin B$

You MUST memorize the following identities and antiderivatives.

5.) $\cos^2 x + \sin^2 x = 1$
6.) $\sin 2x = 2 \sin x \cos x$
7.) $\cos 2x = 2\cos^2 x - 1$ so that $\cos^2 x = \dfrac{1+\cos 2x}{2}$
$= 1 - 2\sin^2 x$ so that $\sin^2 x = \dfrac{1-\cos 2x}{2}$
$= \cos^2 x - \sin^2 x$
8.) $1 + \tan^2 x = \sec^2 x$ so that $\tan^2 x = \sec^2 x - 1$
9.) $1 + \cot^2 x = \csc^2 x$ so that $\cot^2 x = \csc^2 x - 1$

10.) $\displaystyle\int \cos x \ dx = \sin x + C$
11.) $\displaystyle\int \sin x \ dx = -\cos x + C$
12.) $\displaystyle\int \sec^2 x \ dx = \tan x + C$
13.) $\displaystyle\int \csc^2 x \ dx = -\cot x + C$
14.) $\displaystyle\int \sec x \ \tan x \ dx = \sec x + C$
15.) $\displaystyle\int \csc x \ \cot x \ dx = -\csc x + C$
16.) $\displaystyle\int \tan x \ dx = \ln|\sec x| + C$
17.) $\displaystyle\int \cot x \ dx = \ln|\sin x| + C$
18.) $\displaystyle\int \sec x \ dx = \ln|\sec x + \tan x| + C$
19.) $\displaystyle\int \csc x \ dx = \ln|\csc x - \cot x| + C$

20.) $\displaystyle\int \frac{1}{1+x^2} \ dx = \arctan x + C$
and $\displaystyle\int \frac{1}{a^2+x^2} \ dx = \frac{1}{a} \arctan \frac{x}{a} + C$
21.) $\displaystyle\int \frac{1}{\sqrt{1-x^2}} \ dx = \arcsin x + C$
and $\displaystyle\int \frac{1}{\sqrt{a^2-x^2}} \ dx = \arcsin \frac{x}{a} + C$
22.) $\displaystyle\int \frac{1}{x\sqrt{x^2-1}} \ dx = \operatorname{arcsec}|x| + C$
and $\displaystyle\int \frac{1}{x\sqrt{x^2-a^2}} \ dx = \frac{1}{a} \operatorname{arcsec}\left|\frac{x}{a}\right| + C$