

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  $\cos^2 x = \frac{1 + \cos 2x}{2}$   
 $= 1 - 2 \sin^2 x$  so that  $\sin^2 x = \frac{1 - \cos 2x}{2}$   
 $= \cos^2 x - \sin^2 x$
- 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  $\cot^2 x = \csc^2 x - 1$

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| 10.) $\int \cos x \, dx = \sin x + C$                | 20.) $\int \frac{1}{1+x^2} \, dx = \arctan x + C$   |
| 11.) $\int \sin x \, dx = -\cos x + C$               | and $\int \frac{1}{a^2+x^2} \, dx = \frac{1}{a} \arctan \frac{x}{a} + C$                                      |
| 12.) $\int \sec^2 x \, dx = \tan x + C$              | 21.) $\int \frac{1}{\sqrt{1-x^2}} \, dx = \arcsin x + C$  |
| 13.) $\int \csc^2 x \, dx = -\cot x + C$             | and $\int \frac{1}{\sqrt{a^2-x^2}} \, dx = \arcsin \frac{x}{a} + C$   |
| 14.) $\int \sec x \tan x \, dx = \sec x + C$         | 22.) $\int \frac{1}{x\sqrt{x^2-1}} \, dx = \operatorname{arcsec}  x  + C$                                     |
| 15.) $\int \csc x \cot x \, dx = -\csc x + C$        | and $\int \frac{1}{x\sqrt{x^2-a^2}} \, dx = \frac{1}{a} \operatorname{arcsec} \left  \frac{x}{a} \right  + C$ |
| 16.) $\int \tan x \, dx = \ln  \sec x  + C$          |   |
| 17.) $\int \cot x \, dx = \ln  \sin x  + C$          |   |
| 18.) $\int \sec x \, dx = \ln  \sec x + \tan x  + C$ |   |
| 19.) $\int \csc x \, dx = \ln  \csc x - \cot x  + C$ |   |