

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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| <ol style="list-style-type: none"> <li>10.) <math>\int \cos x \, dx = \sin x + C</math></li> <li>11.) <math>\int \sin x \, dx = -\cos x + C</math></li> <li>12.) <math>\int \sec^2 x \, dx = \tan x + C</math></li> <li>13.) <math>\int \csc^2 x \, dx = -\cot x + C</math></li> <li>14.) <math>\int \sec x \tan x \, dx = \sec x + C</math></li> <li>15.) <math>\int \csc x \cot x \, dx = -\csc x + C</math></li> <li>16.) <math>\int \tan x \, dx = \ln  \sec x  + C</math></li> <li>17.) <math>\int \cot x \, dx = \ln  \sin x  + C</math></li> <li>18.) <math>\int \sec x \, dx = \ln  \sec x + \tan x  + C</math></li> <li>19.) <math>\int \csc x \, dx = \ln  \csc x - \cot x  + C</math></li> </ol> | <ol style="list-style-type: none"> <li>20.) <math>\int \frac{1}{1+x^2} \, dx = \arctan x + C</math><br/>                     and <math>\int \frac{1}{a^2+x^2} \, dx = \frac{1}{a} \arctan \frac{x}{a} + C</math></li> <li>21.) <math>\int \frac{1}{\sqrt{1-x^2}} \, dx = \arcsin x + C</math><br/>                     and <math>\int \frac{1}{\sqrt{a^2-x^2}} \, dx = \arcsin \frac{x}{a} + C</math></li> <li>22.) <math>\int \frac{1}{ x \sqrt{x^2-1}} \, dx = \operatorname{arcsec} x + C</math></li> </ol> |
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