More Trig. identities

$$\sin(A+B) = \sin A \cos B + \cos A \sin B$$

$$\sin(A-B) = \sin A \cos B - \cos A \sin B$$

$$\cos(A+B) = \cos A \cos B - \sin A \sin B$$

$$\cos(A-B) = \cos A \cos B + \sin A \sin B$$

If you can remember these identities, you can derive formulas (4)-(9).

Homework Due Monday, November 17, 2014. **Late homework will NOT be accepted.**

1. Evaluate $\displaystyle\int \tan^{-1/2}(2x) \sec^4(2x)\ dx$.
2. Find the volume of the solid formed by revolving the region bounded by the graphs of $y = \sin x + \sec x$, $y = 0$, $x = 0$, and $x = \pi/3$ about the $x-$axis. Use disk method.
3. Find the area of the region in the first quadrant that is enclosed by the coordinate axes and the curve $y = (2 - x^2)^{3/2}$.

① $\int \tan^{-\frac{1}{2}}(2x)\sec^{4}(2x)\,dx = \int \tan^{-\frac{1}{2}}(2x)\sec^{2}(2x)\sec^{2}(2x)\,dx$

$= \int \tan^{-\frac{1}{2}}(2x)\left(1+\tan^{2}(2x)\right)\sec^{2}(2x)\,dx$

$= \frac{1}{2}\int u^{-\frac{1}{2}}(1+u^{2})\,du$

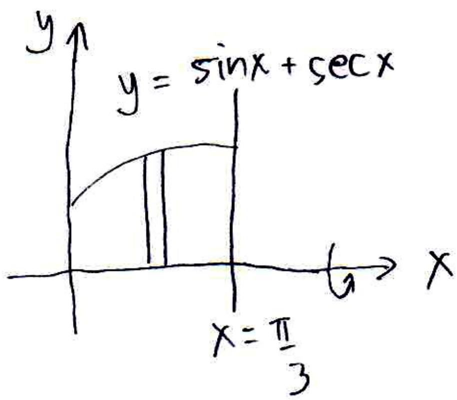
let $u = \tan(2x)$

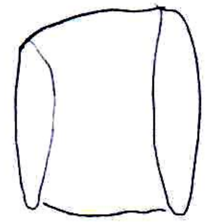
so, $\frac{du}{2} = \sec^{2}(2x)\,dx$

$= \frac{1}{2}\int u^{-\frac{1}{2}} + u^{\frac{3}{2}}\,du$

$= \frac{1}{2}\left[2u^{1/2} + \frac{2}{5}u^{5/2}\right] + C$

$= u^{1/2} + \frac{1}{5}u^{5/2} + C = \tan^{1/2}(2x) + \frac{1}{5}\tan^{5/2}(2x) + C$

② 

$\Rightarrow$ 

$\sin x \sec x$
$= \sin x \cdot \frac{1}{\cos x}$
$= \tan x$

$V = \int_0^{\pi/3} \pi(\sin x + \sec x)^{2}\,dx = \pi\int_0^{\pi/3} \sin^{2}x + 2\tan x + \sec^{2}x\,dx$

$= \pi\int_0^{\pi/3} \left[\frac{1}{2} - \frac{\cos(2x)}{2}\right] + 2\tan x + \sec^{2}x\,dx$

$= \pi\left[\frac{1}{2}x - \frac{1}{4}\sin(2x) + 2\ln|\sec x| + \tan x\right]_0^{\pi/3}$

$= \pi\left(\frac{\pi}{6} - \frac{\sqrt{3}}{8} + 2\ln 2 + \sqrt{3}\right)$

$= \frac{\pi^{2}}{6} + \frac{7\sqrt{3}\pi}{8} + 2\pi\ln 2$