Midterm about a week after we get back from Spring Break.

Old Tests buried in the Homework Videos and Notes for each chapter.

Last semester's Midterm.

Midterm and Final are in-person. Bring a scientific calculator, student ID, pencil/pen, 1 page (2-sided is OK) cheat sheet.

HOR 107 8 am - 6 pm Show Up. Place shuts down at 8 pm. Don't show up any later than 6 pm if you want 2 hours to take it.

MIDTERM WILL BE BASED ON WEEKLY WRITTEN ASSIGNMENTS.

USE THE POWER-REDUCING FORMULAS TO REWRITE THE EXPRESSION IN TERMS OF FIRST POWERS OF THE COSINES OF MULTIPLE ANGLES.

$\sin^2(5x)\cos^2(5x)$

$= \frac{1-\cos(10x)}{2} \cdot \frac{1+\cos(10x)}{2}$

$= \frac{1-\cos^2(10x)}{4} = \frac{1}{4}(1-\cos^2(10x))$

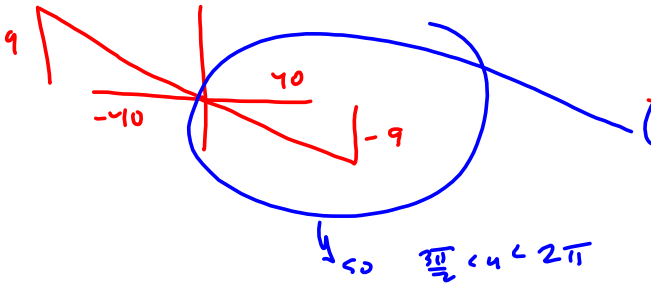
$= \frac{1}{4}\left(1-\frac{1+\cos(20x)}{2}\right) = \frac{1}{4}\left(\frac{2-1-\cos(20x)}{2}\right)$

$= \frac{1}{8}(1+\cos(20x))$

Cheat Sheet for us.

In what quadrant is $u/2$ if $\tan(u) = -\frac{9}{40}$ & $\frac{3\pi}{2} < u < 2\pi$

$\frac{3\pi}{4} < \frac{u}{2} < \pi$ is QII



$\cos(u) > 0$ would achieve the same thing.

u is QIV $\quad \frac{3\pi}{2} < u < 2\pi$

Simplify $\sqrt{\frac{1-\cos(10x)}{2}}$

$\sin(5x) = \pm\sqrt{\frac{1-\cos 10x}{2}}$

$\sin^2(5x) = \frac{1-\cos(10x)}{2}$

$\sqrt{\sin^2(5x)} = \sqrt{\frac{1-\cos(10x)}{2}}$

$|\sin(5x)| = \sqrt{\frac{1-\cos(10x)}{2}}$

$\sqrt{\frac{1-\cos(10x)}{2} \cdot \frac{1+\cos(10x)}{1+\cos(10x)}} = \frac{\sqrt{1-\cos^2(10x)}}{\sqrt{2(1+\cos(10x))}} = \sqrt{\sin^2(10x)}$

$$\sqrt{\frac{1+\cos(\theta)}{1-\sin(\theta)}} = \frac{1+\cos(\theta)}{|\sin(\theta)|}$$

cos

$$\sqrt{\left(\frac{1+\cos\theta}{1-\sin\theta}\right)\left(\frac{1+\sin\theta}{1+\sin\theta}\right)} =$$

$$\sqrt{\left(\frac{(1+\cos\theta)(1+\cos\theta)}{(1-\sin\theta)(1+\cos\theta)}\right)}$$

$$\frac{\cos\theta\cot\theta}{1-\sin\theta} - 1$$

$$= \frac{\cos\theta\cot\theta}{1-\sin\theta} - \frac{(1-\sin\theta)}{1-\sin\theta}$$

$$= \frac{\cos\theta\left(\frac{\cos\theta}{\sin\theta}\right) - 1 + \sin\theta}{1-\sin\theta}$$

$$= \frac{\frac{\cos^2\theta}{\sin\theta} - \frac{\sin\theta}{\sin\theta} + \frac{\sin^2\theta}{\sin\theta}}{1-\sin\theta}$$

$$= \frac{\frac{1-\sin\theta}{\sin\theta}}{\frac{1-\sin\theta}{1}} = \csc\theta, \text{ not } \pm\csc\theta$$

$$= \left(\frac{1-\sin\theta}{\sin\theta}\right)\left(\frac{1}{1-\sin\theta}\right)$$

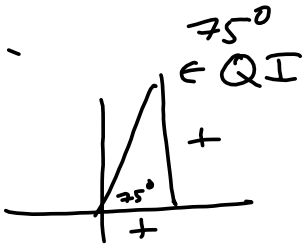
Find exact value of $\sin\theta, \cos\theta, \& \tan\theta$ for...

(a) (5pts) ... $\theta = 75^\circ = \frac{150^\circ}{2}$

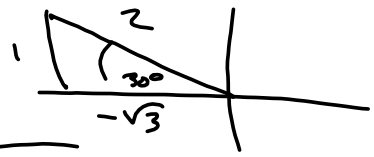
$\theta = \frac{u}{2}$, where $u = 150^\circ$

$\sin\left(\frac{u}{2}\right) = \pm\sqrt{\frac{1-\cos u}{2}} = +\sqrt{\frac{1-\cos(150^\circ)}{2}}$

$75^\circ \in QI$



$= \sqrt{\frac{1-\left(-\frac{\sqrt{3}}{2}\right)}{2}} = \sqrt{\frac{2+\sqrt{3}}{4}} = \frac{\sqrt{2+\sqrt{3}}}{2}$



$\cos\left(\frac{u}{2}\right) = \sqrt{\frac{1+\cos u}{2}} = \sqrt{\frac{1+\left(-\frac{\sqrt{3}}{2}\right)}{2}} = \sqrt{\frac{2-\sqrt{3}}{4}} = \frac{\sqrt{2-\sqrt{3}}}{2}$

$\tan\left(\frac{u}{2}\right) = \frac{\sin\left(\frac{u}{2}\right)}{\cos\left(\frac{u}{2}\right)} = \frac{\sqrt{2+\sqrt{3}}}{\sqrt{2-\sqrt{3}}} = \sqrt{\frac{2+\sqrt{3}}{2-\sqrt{3}}}$

$\frac{1-\cos u}{\sin u} = \frac{1-\left(-\frac{\sqrt{3}}{2}\right)}{\frac{1}{2}} = \frac{2+\sqrt{3}}{1} = 2+\sqrt{3}$

→ Nicer & Cleaner.

sqrt((2 + sqrt(3))/(2 − sqrt(3)))

$$\sqrt{\frac{2+\sqrt{3}}{2-\sqrt{3}}}$$

?!

evalf(%)

3.732050810

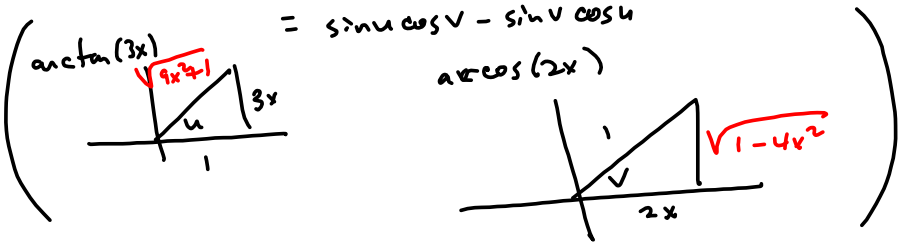
evalf(2 + sqrt(3))

3.732050808

$$\sin\left(\arctan(3x)-\arccos(2x)\right)$$

$= \sin(u-v) = \sin u\cos(-v) + \sin(-v)\cos(u)$

$= \sin u\cos v - \sin v\cos u$



$$= \frac{3x}{\sqrt{9x^2+1}} \cdot 2x - \frac{\sqrt{1-4x^2}}{1} \cdot \frac{1}{\sqrt{9x^2+1}}$$

$$= \frac{6x^2-\sqrt{1-4x^2}}{\sqrt{9x^2+1}}$$

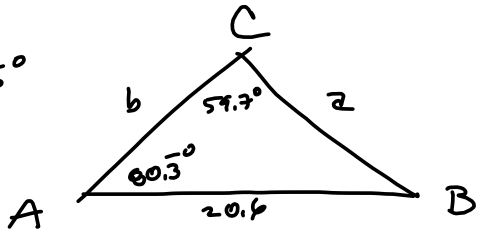
Looks like Week 6 #2 is messed-up. Free points, there!

5.3.1 #4

$A = 80°20' = 80.\overline{3}°$

$C = 59.7°$

$c = 20.6$



$B = 180° - A - C = 180° - 80.\overline{3}° - 59.7° = 39.9\overline{6}° \approx 39.96666667° \approx B$

$$\frac{a}{\sin A} = \frac{20.6}{\sin(59.7°)} = \frac{c}{\sin C}$$

$$a = \frac{c \sin(A)}{\sin(C)} =$$

$$b = \frac{c \sin(B)}{\sin(C)}$$