§2.3 Homework will be posted later this morning.

§2.4 by noon? I'll have it up

§2.3 due Monday

Chapter 1 Re-take

1 week from Wednesday.

Mar 21-8:23 AM

$\sin^{1/2}x\cos x - \sin^{5/2}x\cos x = \cos^3 x\sqrt{\sin x}$

↳ we must assume, here, that x is such that it makes $\sin x \geq 0$.

Recall $\frac{a+bi}{c+di}\cdot\frac{c-di}{c-di}$ Conjugate trick

#s 24, 30, 31, 32, 40, 41, 42 involve this sort of trick.

(24) $\frac{\sec\theta-1}{1-\cos\theta} = \frac{\sec\theta-1}{1-\cos\theta}\cdot\frac{1+\cos\theta}{1+\cos\theta}$

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

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

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

$= \frac{\frac{\sin^2\theta}{\cos\theta}}{\frac{\sin^2\theta}{1}} = \frac{\sin^2\theta}{\cos\theta}\cdot\frac{1}{\sin^2\theta} = \frac{1}{\cos\theta} = \sec\theta$

24 re-done

$$\left(\frac{\sec\theta-1}{1-\cos\theta}\right)\left(\frac{\sec\theta+1}{\sec\theta+1}\right)=\frac{\sec^2\theta-1}{\sec\theta+1-\cos\theta\sec\theta-\cos\theta}$$

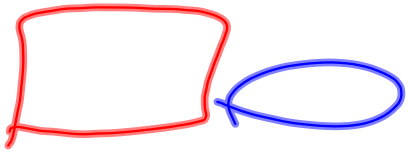
$$=\frac{\tan^2\theta}{\sec\theta+1-1-\cos\theta}=\frac{\tan^2\theta}{\sec\theta-\cos\theta}=\frac{\tan^2\theta}{\frac{1}{\cos\theta}-\frac{\cos^2\theta}{\cos\theta}}$$

$$=\frac{\tan^2\theta}{\frac{\sin^2\theta}{\cos\theta}}=\frac{\tan^2\theta}{\sin^2\theta}\cdot\frac{1}{\cos\theta}=\frac{\frac{\sin^2\theta}{\cos^2\theta}}{\sin^2\theta\cos\theta}$$

M. is handled the fraction.

$$=\frac{\sin^2\theta}{\cos^2\theta\sin^2\theta\cos\theta}$$

Ryan's a big help.

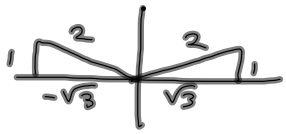


$$\frac{\tan^2\theta}{\left(\frac{\sin^2\theta}{\cos\theta}\right)}=\frac{\tan^2\theta}{\tan\theta\cdot\sin\theta}$$

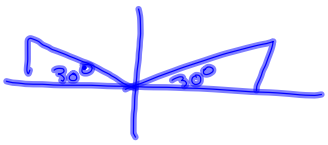
$$=\frac{\tan\theta}{\sin\theta}=\frac{\left(\frac{\sin\theta}{\cos\theta}\right)}{\frac{\sin\theta}{1}}=\frac{\sin\theta}{\cos\theta}\cdot\frac{1}{\sin\theta}=\sec\theta$$

$\sin(2x) = \frac{1}{2}$

If you can capture all solutions in $[0, 2\pi]$, you can find ALL solutions.



Picture for $2x$



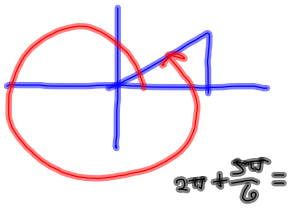
$2x = 30^\circ = \frac{\pi}{6}$

OR

$2x = 150^\circ = \frac{5\pi}{6}$

So $x = 15^\circ = \frac{\pi}{12}$ OR $x = 75^\circ = \frac{5\pi}{12}$

Wait! There's More!

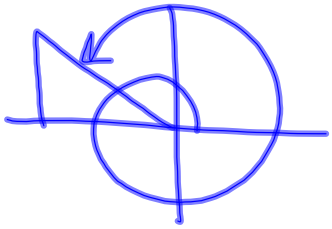


$2x = \frac{13\pi}{6} = 390^\circ$

$\Rightarrow x = \frac{13\pi}{12} = 195^\circ$

OR

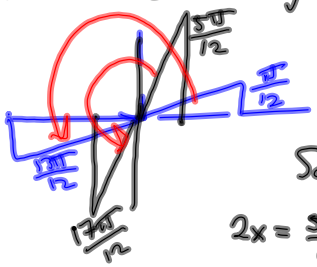
Not used to looking for these solutions on a 2nd time around the circle



$2x = \frac{17\pi}{6} = 510^\circ$

$x = \frac{17\pi}{12} = 255^\circ$

Put it all together:



$\frac{17\pi}{12} = \frac{18\pi}{12} - \frac{\pi}{12} = \frac{3\pi}{2} - \frac{\pi}{12}$

Solutions for $2x$:

$2x = \frac{5\pi}{6} + 2n\pi$

OR

$2x = \frac{\pi}{6} + 2n\pi$

$\Rightarrow$

$x = \frac{5\pi}{12} + n\pi$

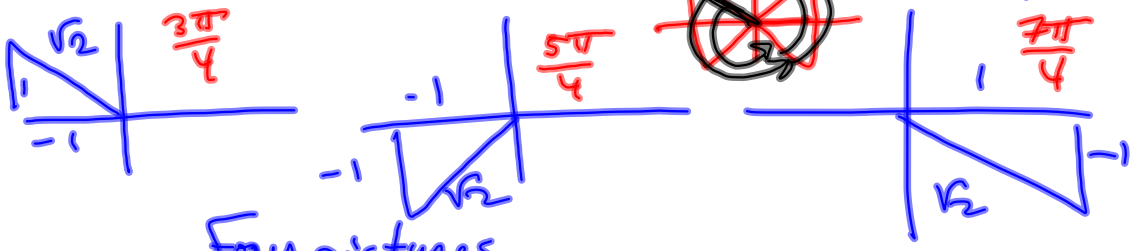
$x = \frac{\pi}{12} + n\pi$

} There they are.

$\sin^2(2x) = \frac{1}{2}$

$\sin(2x) = \pm\sqrt{\frac{1}{2}} = \pm\frac{1}{\sqrt{2}}$

2x pictures



Four pictures.

Pictures for x:

$x = \frac{\pi}{8} + \frac{n\pi}{2}$

$x = \frac{3\pi}{8} + \frac{n\pi}{2}$

$n \in \mathbb{Z}$

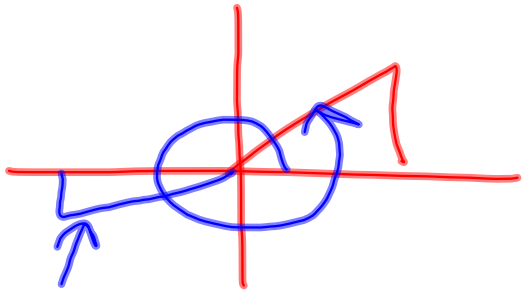
Solutions for 2x:

$2x = \frac{\pi}{4} + n\pi$

$2x = \frac{3\pi}{4} + n\pi$

Just divide by 2.

n



$2x = \frac{\pi}{4}$

$2x = \frac{\pi}{4} + 2\pi = \frac{9\pi}{4}$

Divide by 2

$\frac{9\pi}{8}$

$\frac{9\pi}{8}$ we get by dividing $\frac{9\pi}{4}$ by 2.

For 2x, you're going to have some x's from the 2nd time around the circle.