Review Problems

15) $\csc x - \cos^2 x \csc x$

$\csc x \,(1-\cos^2 x)$

$\csc x \,(\sin^2 x)$

$\frac{1}{\cancel{\sin x}} \cdot \sin^{\cancel{2}} x$

$= \boxed{\sin x}$

16) $\cos^2 x + \tan^2 x \cos^2 x = 1$

$\cos^2 x\,(1+\tan^2 x) = 1$

$\cos^2 x \cdot \sec^2 x$

$\cos^2 x \cdot \frac{1}{\cos^2 x}$

✓ $1 = 1$

17) $\frac{1-\cos\theta}{1+\cos\theta} = (\csc\theta - \cot\theta)^2$

$(\csc\theta - \cot\theta)(\csc\theta - \cot\theta)$

$\csc^2\theta - 2\csc\theta\cot\theta + \cot^2\theta$

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

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

$\frac{(1-\cos\theta)(1-\cos\theta)}{1-\cos^2\theta}$

$\frac{1-\cos\theta}{1+\cos\theta} = \frac{\cancel{(1-\cos\theta)}(1-\cos\theta)}{\cancel{(1-\cos\theta)}(1+\cos\theta)}$ ✓

18) $\dfrac{\sec\theta + 1}{\tan\theta} = \dfrac{\tan\theta}{\sec\theta - 1}$

$\dfrac{\tan\theta}{\tan\theta} \cdot \dfrac{(\sec\theta + 1)}{\tan\theta}$

$\dfrac{\tan\theta(\sec\theta + 1)}{\tan^2\theta}$

$\dfrac{\tan\theta(\sec\theta + 1)}{\sec^2\theta - 1}$

$\dfrac{\tan\theta(\cancel{\sec\theta + 1})}{(\sec\theta - 1)\cancel{(\sec\theta + 1)}}$

$\dfrac{\tan\theta}{\sec\theta - 1} = \dfrac{\tan\theta}{\sec\theta - 1}$ ✓

19) You try!

- factor numerator
- look for Pyth. Identities
- remember if $\dfrac{a+b}{c}$ then $\dfrac{a}{c} + \dfrac{b}{c}$

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20) $\cos(150° + 45°) = \cos 150° \cdot \cos 45° - \sin 150° \sin 45°$

$$-\frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} - \frac{1}{2} \cdot \frac{\sqrt{2}}{2}$$

$$\boxed{\frac{-\sqrt{6} - \sqrt{2}}{4}}$$

21) $\cos(15°) = \cos(45° - 30°)$

you do the work :)

$$\frac{\sqrt{6} + \sqrt{2}}{4}$$

22) $\sin\left(-\frac{17\pi}{12}\right) = \sin\left(-\frac{8\pi}{12} - \frac{9\pi}{12}\right)$

$\sin\left(-\frac{2\pi}{3} - \frac{3\pi}{4}\right) = \sin\left(-\frac{2\pi}{3}\right)\cos\left(\frac{3\pi}{4}\right) - \cos\left(-\frac{2\pi}{3}\right) \cdot \sin\left(\frac{3\pi}{4}\right)$

$$\left(-\frac{\sqrt{3}}{2}\right) \cdot \left(-\frac{\sqrt{2}}{2}\right) - \left(-\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$$

$$\boxed{\frac{\sqrt{6} + \sqrt{2}}{4}}$$

23) $\tan\left(\frac{11\pi}{12}\right) = \tan\left(\frac{8\pi}{12} + \frac{3\pi}{12}\right)$

$\tan\left(\frac{2\pi}{3} + \frac{\pi}{4}\right)$

you do the work!

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

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37) $\sin x \tan x - \frac{\sqrt{2}}{2}\tan x = 0$

$\tan x\left(\sin x - \frac{\sqrt{2}}{2}\right) = 0$

$\tan x = 0 \qquad \sin x = \frac{\sqrt{2}}{2}$

$0 + 2\pi n \qquad \frac{\pi}{4} + 2\pi n$

$\pi + 2\pi n \qquad \frac{3\pi}{4} + 2\pi n$

39) $\cos^2 x + \cos x - 2 = 0$

$(\cos x + 2)(\cos x - 1) = 0$

$\cos x = -2 \qquad \cos x = 1$

no soln $\qquad 0 + 2\pi n$

If directions say $[0, 2\pi)$

don't add $2\pi n$