HW8 MATH 1540 Fall 2018

$\cos^2(x)+\sin^2(x)=1$

$\cos^2(x)=1-\sin^2(x)$

Section 9.1 #20

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

$$=\frac{1+\cancel{\cos(x)}-\cancel{\cos(x)}+\cos^2(x)}{1-\cos^2(x)}$$

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

#21

$$(\sec(x)+\csc(x))(\sin(x)+\cos(x))-2-\cot(x)$$

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

$$=\frac{\sin(x)+\cos(x)}{\cos(x)\sin(x)}(\sin(x)+\cos(x))-2-\frac{\cos(x)}{\sin(x)}$$

$$=\frac{\sin(x)+\cos(x)}{\cos(x)}+\frac{\sin(x)+\cos(x)}{\sin(x)}-2-\frac{\cos(x)}{\sin(x)}$$

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

$$=\frac{\sin(x)}{\cos(x)}=\tan(x)$$

#22

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

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

$$=\left(\frac{\sin(x)}{\cos(x)}\right)\left(\frac{1}{\cos(x)}\right)$$

$$=\tan(x)\sec(x)$$

#29 Start w/ left:

$$\cos(x) - \cos^3(x) = \cos(x)\underbrace{\left[1-\cos^2(x)\right]}_{=\sin^2(x)}$$

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

#30 Start w/ left:

$$\cos(x)\left(\tan(x) - \sec(-x)\right) = \cos(x)\left[\frac{\sin(x)}{\cos(x)} - \frac{1}{\cos(-x)}\right] \qquad \cos(-x) = \cos(x)$$

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

$$= \sin(x) - 1$$

#32 Start w/ left:

$$(\sin(x)+\cos(x))^2 = (\sin(x)+\cos(x))(\sin(x)+\cos(x))$$

$$= \sin^2(x) + 2\sin(x)\cos(x) + \cos^2(x)$$

$$= 1 + 2\sin(x)\cos(x)$$

#33 Start w/ right:

$$2 - \sin^2(x) - \sec^2(x) = 2 - (1-\cos^2(x)) - (\tan^2(x)+1)$$

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

$$= \cos^2(x) - \tan^2(x)$$

$\sin^2(x)+\cos^2(x)=1$ — div by $\cos^2(x)$ → $\tan^2(x)+1=\sec^2(x)$

$\sin^2(x) = 1-\cos^2(x)$

↓

$\sec^2(x)$

Problem A Start w/ left

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

Problem B Start w/ right:

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

~~$= \sin(x)\tan(x)$~~

Problem C : Start w/ left:

$$\frac{\cos(x)}{\sin(x)\cot(x)} = \frac{\cos(x)}{\sin(x)\left(\frac{\cos(x)}{\sin(x)}\right)} = \frac{\cos(x)}{\sin(x)} \cdot \frac{\sin(x)}{\cos(x)} = 1$$