

# Friday Bookwork 3/20

39.  $\csc u - \cot u = \frac{\sin u}{1 + \cos u}$  conjugate problem

$$\frac{1}{\sin u} - \frac{\cos u}{\sin u} = \frac{1 - \cos u}{\sin u} \cdot \frac{1 + \cos u}{1 + \cos u} = \frac{1 - \cos^2 u}{\sin u (1 + \cos u)} = \frac{\sin^2 u}{\sin u (1 + \cos u)} = \frac{\sin u}{1 + \cos u} \checkmark$$

or  $\csc u - \cot u = \frac{\sin u}{1 + \cos u}$

$$\frac{\sin u}{1 + \cos u} \cdot \frac{1 - \cos u}{1 - \cos u} = \frac{\sin u (1 - \cos u)}{1 - \cos^2 u} = \frac{\sin u (1 - \cos u)}{\sin^2 u} = \frac{1 - \cos u}{\sin u} = \frac{1}{\sin u} - \frac{\cos u}{\sin u} = \csc u - \cot u \checkmark$$

43.  $\frac{1 + \tan v}{1 - \tan v} = \frac{\cot v + 1}{\cot v - 1}$

$$= \frac{1 + \frac{1}{\cot v}}{1 - \frac{1}{\cot v}} \cdot \frac{\cot v}{\cot v} = \frac{\cot v + 1}{\cot v - 1} \checkmark$$

or  $\frac{1 + \frac{\sin v}{\cos v}}{1 - \frac{\sin v}{\cos v}} \cdot \frac{\cos v}{\cos v} = \frac{\cos v + \sin v}{\cos v - \sin v} \cdot \frac{1}{\sin v} = \frac{\frac{\cos v}{\sin v} + 1}{\frac{\cos v}{\sin v} - 1} = \frac{\cot v + 1}{\cot v - 1} \checkmark$

47.  $\frac{1 + \sin \theta}{1 - \sin \theta} = \frac{\csc \theta + 1}{\csc \theta - 1}$

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

or you could go the other direction

$$51. \frac{\sin \theta}{\sin \theta - \cos \theta} = \boxed{\frac{1}{1 - \cot \theta}}$$

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

$$\text{or } \boxed{\frac{\sin \theta}{\sin \theta - \cos \theta}} = \frac{1}{1 - \cot \theta}$$

$$\frac{(1)}{(1 - \frac{\cos \theta}{\sin \theta})} \cdot \frac{\sin \theta}{\sin \theta} = \boxed{\frac{\sin \theta}{\sin \theta - \cos \theta}} \checkmark$$