Handout 18 Solutions

1)

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

2)

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

3)

$$\frac{1+\tan\theta}{1+\cot\theta} = \frac{1+\frac{\sin\theta}{\cos\theta}}{1+\frac{\cos\theta}{\sin\theta}} = \frac{\frac{\cos\theta+\sin\theta}{\cos\theta}}{\frac{\sin\theta+\cos\theta}{\sin\theta}} = \frac{\sin\theta}{\cos\theta} = \tan\theta$$

4)

$$\cos(15^\circ) = \cos(60^\circ - 45^\circ) = \cos(60^\circ)\cos(45^\circ) + \sin(60^\circ)\sin(45^\circ) =$$

$$\frac{1}{2}\cdot\frac{1}{\sqrt{2}} + \frac{\sqrt{3}}{2}\cdot\frac{1}{\sqrt{2}} = \frac{1+\sqrt{3}}{2\sqrt{2}}$$

Note: there are other valid ways to find and express the solution exactly.

5)

$$\sin(-165^\circ) = \sin(360^\circ - 165^\circ) = \sin(195^\circ) = \sin(180^\circ + 15^\circ) =$$

$$\sin(180^\circ)\cos(15^\circ) + \cos(180^\circ)\sin(15^\circ) = 0 + -1\cdot\sin(15^\circ) =$$

$$-\sin(15^\circ) = -\frac{1+\sqrt{3}}{2\sqrt{2}}$$ (See problem 4

6)

$$\sin(43^\circ)\cos(17^\circ) + \sin(17^\circ)\cos(43^\circ) = \sin(43^\circ + 17^\circ) = \sin(60^\circ) = \frac{\sqrt{3}}{2}$$

7)

$$\frac{\tan\left(\frac{8\pi}{9}\right)+\tan\left(\frac{7\pi}{9}\right)}{1-\tan\left(\frac{8\pi}{9}\right)\tan\left(\frac{7\pi}{9}\right)} = \tan\left(\frac{8\pi}{9}+\frac{7\pi}{9}\right) = \tan\left(\frac{15\pi}{9}\right) = \tan\left(\frac{5\pi}{3}\right) = -\sqrt{3}$$