Midterm Review
Chapter 7

Name Key

Simplify:

1. $(\sec\theta - \tan\theta)(1 + \sin\theta)$ $= \sec\theta + \sin\theta\sec\theta - \tan\theta - \tan\theta\sin\theta$ ($\sec\theta = \frac{1}{\cos\theta}$)

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

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

2. $\dfrac{\sec^2\theta}{\tan\theta + \cot^2\theta\tan\theta}$

$= \tan\theta$

$= \frac{\tan^2\theta + 1}{\tan\theta(1+\cot^2\theta)} = \frac{\sec^2\theta}{\tan\theta(\csc^2\theta)} = \frac{\frac{1}{\cos^2\theta}}{\tan\theta\cdot\frac{1}{\sin^2\theta}} = \frac{\frac{1}{\cos^2\theta}\cdot\sin^2\theta}{\tan\theta}$

$= \frac{\tan^2\theta}{\tan\theta} = \tan\theta$

3. $\sin\theta + \cos\theta\tan\theta$

$2\sin\theta$

$= \sin\theta + \cos\theta\cdot\frac{\sin\theta}{\cos\theta} = \sin\theta + \sin\theta = 2\sin\theta$

4. $\cos x + \sin x\tan x$ $= \cos x + \sin x\cdot\frac{\sin x}{\cos x} = \cos x + \frac{\sin^2 x}{\cos x}$

$\sec x$

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

5. $\dfrac{\cot A}{\tan A}$ $= \dfrac{\cot A}{1/\cot A} = \cot A\cdot\cot A = \cot^2 A$

$\cot^2 A$

6. $\sin^2\theta\cos^2\theta - \cos^2\theta$ $= \cos^2\theta(\sin^2\theta - 1) = \cos^2\theta(-\cos^2\theta)$

$= -\cos^4\theta$

$-\cos^4\theta$

7. $\dfrac{1-\cos^2\theta}{1+\cot^2\theta}$ $= \dfrac{\sin^2\theta}{\csc^2\theta} = \dfrac{\sin^2\theta}{\frac{1}{\sin^2\theta}} = \sin^2\theta\cdot\sin^2\theta = \sin^4\theta$

* change sign

$\sin^4\theta$

8. If $\tan\theta = \frac{3}{4}$ and $90° < \theta < 180°$, find $\sec\theta$

Quad 2

$\frac{1}{\cos}$; cos neg in Quad 2

$\tan^2\theta + 1 = \sec^2\theta$

$\left(\frac{3}{4}\right)^2 + 1 = \sec^2\theta$

$\frac{9}{16} + \frac{16}{16} = \sec^2\theta$

$= \frac{25}{16} = \sec^2\theta$

$\sec = -\frac{5}{4}$

$-5/4$

9. If $\sin\theta = \frac{3}{5}$, find $\tan\theta$.

$\cos^2\theta = 1 - \sin^2\theta$

$= 1 - 9/25 = \frac{25}{25} - \frac{9}{25} = \frac{16}{25}$

$\cos\theta = \frac{4}{5}$

$\tan\theta = \frac{\sin\theta}{\cos\theta}$

$= \frac{3/5}{4/5} = 3/5 \cdot 5/4 = \pm 3/4$

$\pm 3/4$

10. If $\sin\theta = \frac{2}{3}$, find $\cos\theta$.

$\cos^2\theta = 1 - \sin^2\theta$

$= 1 - \frac{4}{9} = \frac{9}{9} - \frac{4}{9} = \frac{5}{9}$

$\cos\theta = \frac{\sqrt{5}}{3}$

$\frac{\sqrt{5}}{3}$

11. If $\tan\theta = \frac{7}{2}$, find $\sin\theta$.

$\cot\theta = \frac{2}{7}$

$\csc^2\theta = 1 + \cot^2\theta = 1 + \frac{4}{49} = \frac{49}{49} + \frac{4}{49} = \frac{53}{49}$

$\sin^2\theta = \frac{49}{53}$

$\sin\theta = \frac{7}{\sqrt{53}} \cdot \frac{\sqrt{53}}{\sqrt{53}} = \frac{7\sqrt{53}}{53}$

$\frac{7\sqrt{53}}{53}$

12. If $\tan\theta = 2$, find $\cot\theta$.

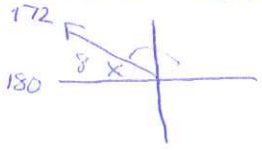
These are reciprocals!

$\frac{1}{2}$

Express each value as a trig function of an angle in Quadrant I:

13. cos 892

$892 - 360 - 360 = 172°$



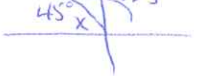
cos is neg in Quad 2 so

$-\cos 8$

$-\cos 8$

14. csc 495

$495 - 360 = 135°$



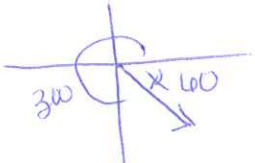
$\csc 45°$

Sin is ⊕ in Quad 2

$\csc 45$

15. $\sin\frac{23\pi}{3}$

$\frac{23\pi}{3} \cdot \frac{180}{\pi} = 1380 - 360 - 360 - 360 = 300°$



sin is ⊖ in Quad 4

$-\sin 60°$

or $-\sin\frac{\pi}{3}$

$-\sin\pi/3$