HOMEWORK 8 - MATH 140

DUE DATE: Monday, November 7
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each homework problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Find the exact value of the following expressions without using a calculator:

$$(a)\ \cos^{-1}(\cos\frac{4\pi}{5}) \quad (b)\ \sin^{-1}(\sin(-\frac{3\pi}{7})) \quad (c)\ \tan^{-1}(\tan\frac{2\pi}{5})$$

2. Find the exact value of the following expressions:
   (a) $\cos(\sin^{-1}\frac{\sqrt{2}}{2})$
   (b) $\tan(\cos^{-1}(-\frac{\sqrt{3}}{2}))$
   (c) $\cos(\cos^{-1}\frac{5\pi}{4})$
   (d) $\sec(\tan^{-1}\frac{1}{2})$

3. Do the indicated work:
   (a) Multiply $\frac{\cos\theta}{1-\sin\theta}$ by $\frac{1+\sin\theta}{1+\sin\theta}$.
   (b) Rewrite over common denominator: $\frac{\sin\theta+\cos\theta}{\cos\theta}+\frac{\cos\theta-\sin\theta}{\sin\theta}$.
   (c) Factor and simplify $\frac{3\sin^2\theta+4\sin\theta+1}{\sin^2\theta+2\sin\theta+1}$.

4. Establish each of the following identities:
   (a) $\frac{\cos\theta}{1+\sin\theta}+\frac{1+\sin\theta}{\cos\theta}=2\sec\theta$
   (b) $\frac{1-\cos\theta}{1+\cos\theta}=(\csc\theta-\cot\theta)^2$
   (c) $\frac{\sin^2\theta-\tan\theta}{\cos^2\theta-\cot\theta}=\tan^2\theta$

5. Show that $\tan(\cos^{-1}v)=\frac{\sqrt{1-v^2}}{v}$.

6. If $\tan\alpha=-\frac{4}{3}, \frac{\pi}{2}<\alpha<\pi$, and $\cos\beta=\frac{1}{2}, 0<\beta<\frac{\pi}{2}$, find the values of
$$\sin(\alpha+\beta), \cos(\alpha+\beta), \tan(\alpha-\beta).$$

7. Establish the following identities:
   (a) $\frac{\sin(\alpha+\beta)}{\sin\alpha\cos\beta}=1+\cot\alpha\tan\beta$
   (b) $\frac{\cos(\alpha-\beta)}{\sin\alpha\cos\beta}=\cot\alpha+\tan\beta$
   (c) $\sec(\alpha+\beta)=\frac{\csc\alpha\csc\beta}{\cot\alpha\cot\beta-1}$

8. Find the exact values of

$$(a)\ \sin(\sin^{-1}\frac{3}{5}-\cos^{-1}(-\frac{4}{5})) \quad (b)\ \cos(\tan^{-1}\frac{4}{3}+\cos^{-1}\frac{5}{13})$$