

HOMEWORK 9 - MATH 140

DUE DATE: Monday, November 8

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 each expression:

$$\cos^{-1} 1, \quad \cos^{-1}(-1), \quad \tan^{-1}(-1), \quad \sin^{-1}\left(-\frac{\sqrt{3}}{2}\right), \quad \sin^{-1}\left(-\frac{\sqrt{2}}{2}\right).$$

2. Find the exact value of each expression:

$$\tan(\tan^{-1}(7.4)), \quad \sin^{-1}\left(\sin\left(-\frac{\pi}{10}\right)\right), \quad \cos(\cos^{-1}(-0.05)).$$

3. Find the exact value of each expression:

$$\sin(\cos^{-1}(\frac{1}{2})), \quad \tan(\sin^{-1}(-\frac{1}{2})), \quad \tan^{-1}(\tan(\frac{2\pi}{3})), \quad \cos(\sin^{-1}(\frac{\sqrt{2}}{3})).$$

4. Establish each identity:

(a) $\sec \theta \cdot \sin \theta = \tan \theta$

(b) $(\csc \theta - 1)(\csc \theta + 1) = \cot^2 \theta$

(c) $\frac{\cos \theta}{1+\sin \theta} + \frac{1+\sin \theta}{\cos \theta} = 2 \sec \theta$

5. Establish each identity

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

(b) $\frac{1-\cos \theta}{1+\cos \theta} = (\csc \theta - \cot \theta)^2$

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

7. Find the exact value of each trigonometric function:

$$\sin \frac{\pi}{12}, \quad \tan \frac{19\pi}{12}, \quad \cos 40^\circ \cos 10^\circ + \sin 40^\circ \sin 10^\circ, \quad \sin \frac{\pi}{18} \cos \frac{5\pi}{18} + \cos \frac{\pi}{18} \sin \frac{5\pi}{18}.$$

8. Establish each identity:

(a) $\cos(\frac{\pi}{2} + \theta) = -\sin \theta$

(b) $\frac{\sin(\alpha+\beta)}{\cos \alpha \cos \beta} = \tan \alpha + \tan \beta$

(c) $\sec(\alpha - \beta) = \frac{\sec \alpha \sec \beta}{1 + \tan \alpha \tan \beta}$