

**MATH 156**      **Test 2 ( sec. 2.4 - 3.4)**

**Show all your work in the provided space. No work no credit**

1. (6 pts) Find the exact value of  $\cos \left[ \tan^{-1} \left( \frac{5}{12} \right) - \sin^{-1} \left( \frac{-3}{5} \right) \right]$

2. (4 each) Let  $\tan \alpha = \frac{-4}{3}, \frac{\pi}{2} < \alpha < \pi; \cos \beta = \frac{1}{2}, 0 < \beta < \frac{\pi}{2}$ . Find the exact value of:

a)  $\sin(\alpha - \beta)$

b)  $\cos(\alpha + \beta)$

3. (3 each) Find the exact value of each expression. Do **NOT** use a Calculator

a)  $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

b)  $\tan^{-1}(0)$

c)  $\cot^{-1}\left(\frac{-\sqrt{3}}{3}\right)$

d)  $\cos^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right)$

e)  $\cos\left(\sin^{-1}\left(\frac{1}{4}\right)\right)$

f)  $\tan\left(\tan^{-1}\left(\frac{-3}{2}\right)\right)$

4. (4 each) Find the amplitude, period, and sketch the graph showing all five key-points (in one period).

a)  $y = 2 \cos 4x$

b)  $y = -\sin \frac{\pi}{2}x$

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c)  $y = 2 \cos\left(\frac{1}{2}x - \pi\right)$

d)  $y = 6 \sin\left(x - \frac{\pi}{3}\right)$

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5. (3 each) Sketch one period of each of the following 4 graphs.

a)  $y = \tan\left(\frac{1}{4}x\right)$

b)  $y = \cot\left(\frac{\pi}{4}x\right)$

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c)  $y = 2 \sec x$

d)  $y = \csc(x + \pi)$

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6. (5 each) Verify the identity.

a)  $\tan \theta \cot \theta - \cos^2 \theta = \sin^2 \theta$

b)  $\frac{\sec \theta - \csc \theta}{\sec \theta \csc \theta} = \sin \theta - \cos \theta$

7. (3 each) Find the exact value of:

a)  $\sin 15^\circ$

b)  $\cos \frac{\pi}{12} \cos \frac{5\pi}{12} + \sin \frac{\pi}{12} \sin \frac{5\pi}{12}$

8. (4 pts.) Write the equation of a sine function that has amplitude = 3, period =  $\frac{2\pi}{3}$ , and phase shift =  $\frac{-\pi}{4}$

9. (5 each) Verify the identity :

a)  $\frac{1 - \sin t}{\cos t} + \frac{\cos t}{1 - \sin t} = 2 \sec t$

b)  $\ln |1 + \cos \theta| + \ln |1 - \sin \theta| = 2 \ln |\sin \theta|$

c)  $\tan(\pi - \theta) = -\tan \theta$

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

10. (5 pts.) (**Bonus**) Find the exact value of  $\sin \left( \sin^{-1} \frac{\sqrt{3}}{2} + \cos^{-1} 1 \right)$