

MATH 1700: TAKE HOME 02 (20 POINTS)

DUE THE DAY OF TEST 2 AT THE BEGINNING OF CLASS

NAME: _____

DIRECTIONS: Make sure your work is neat and complete and uses the techniques demonstrated in class.

1. Verify the following identities.

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

(b) $\frac{1}{1 - \sin(\theta)} + \frac{1}{1 + \sin(\theta)} = 2 \sec^2(\theta)$

(c) $\frac{1}{1 - \sin(\theta)} = \sec^2(\theta) + \sec(\theta) \tan(\theta)$

2. Suppose α is a Quadrant III angle with $\tan(\alpha) = \frac{5}{12}$.

(a) Find and simplify $\sin(\alpha)$.

(b) Find and simplify $\cos(\alpha)$.

(c) Find and simplify $\cos\left(\alpha - \frac{\pi}{6}\right)$.

3. Use the difference formula for sine to verify the identity: $\sin(\pi - \theta) = \sin(\theta)$.

4. Find A , ω , ϕ , and B so that $\sqrt{3}\sin(2t) - \cos(2t) = A\sin(\omega t + \phi) + B$.

5. Suppose $\frac{3\pi}{2} < \theta < 2\pi$ with $\sin(\theta) = -\frac{3}{5}$.

(a) Find and simplify $\cos(\theta)$.

(b) Find and simplify: $\sin(2\theta)$ and $\cos(2\theta)$.

(c) Find and simplify: $\cos\left(\frac{\theta}{2}\right)$ and $\sin\left(\frac{\theta}{2}\right)$.

6. Explain why even though $\frac{11\pi}{6}$ is a Quadrant IV angle with $\sin\left(\frac{11\pi}{6}\right) = -\frac{1}{2}$, $\arcsin\left(-\frac{1}{2}\right) \neq \frac{11\pi}{6}$?

7. Find the exact values of the following:

(a) $\arcsin\left(\frac{\sqrt{3}}{2}\right)$

(f) $\operatorname{arcsec}(2)$

(b) $\arccos\left(-\frac{\sqrt{2}}{2}\right)$

(g) $\sin\left(\arcsin\left(\frac{42}{117}\right)\right)$

(c) $\arctan(-1)$

(h) $\arcsin(\sin(\pi))$

(d) $\operatorname{arccot}(-1)$

(i) $\cot(\arctan(3))$

(e) $\operatorname{arccsc}(-2)$

(j) $\arccos\left(\cos\left(\frac{7\pi}{4}\right)\right)$

8. Find the exact value of the following:

(a) $\sec(\arctan(2))$

(b) $\cos\left(2\arcsin\left(\frac{7}{25}\right)\right)$

(c) $\sin(2\operatorname{arcsec}(-5))$.

9. Rewrite as an algebraic function of x : $\sec(\arctan(2x))$.

10. Find A , ω , and ϕ so that $3 \sin(117t) - 4 \cos(117t) = A \sin(\omega t + \phi)$.

11. Find the solutions to the following equations which lie in $[0, 2\pi)$. Exact answers only, please.

(a) $\sin(3\theta) = -1$

(b) $42 - \cot(\theta) = 0$

(c) $\sec^2(t) = \tan(t) + 3$

(d) $\cos(2t) = 2 - 5\cos(t)$