Pre-Calculus Name: Date: Period:

Unit 8 Test- Part 2 (8C/8D) Practice Test - SOLUTIONS

Complete the problems below, show your work, and write your answer in the blank provided.

Target 8D I can graph and solve problems involving composition and combinations of trigonometric functions.

Calculators Allowed

1. Find the approximate value of each expression. Express your answer in degrees rounded to the nearest tenth.

a. $sin^{-1}(0.287) = 16.7°$

b. $\arcsin(0.823) = 55.4°$

2. Show the steps to find the *exact value* of these:

a) $\sin(\tan^{-1} 1)$.

$$\textit{Since } \tan^{-1} 1 = \frac{\pi}{4}$$

$$\sin(\tan^{-1} 1) = \sin\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$$

b) $\csc(\sec^{-1}(2))$

$$\textit{Since } \sec^{-1}(2) = \cos^{-1}\left(\frac{1}{2}\right) = \frac{\pi}{3}$$

$$\csc(\sec^{-1}(2)) = \csc\left(\frac{\pi}{3}\right) = \frac{1}{\sin\left(\frac{\pi}{3}\right)} = \frac{1}{\frac{\sqrt{3}}{2}} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

3. Find at algebraic expression equivalent to the given expression. (Hint: Form a right triangle.)

a) $\cos(\tan^{-1}x)$

Let $\tan^{-1} x = \theta$, *we know,* $\tan\theta = x$

So, $opp = x$, *and* $adj = 1$.

From Pythagorean Theorem: $hyp = \sqrt{x^2 + 1}$

$$\cos\theta = \frac{1}{\sqrt{x^2 + 1}}$$

b) $\sin\left(\sec^{-1}\left(\frac{1}{x}\right)\right)$

$$Let\ \sec^{-1}\left(\frac{1}{x}\right) = \theta, \quad so\ \sec\theta = \frac{1}{x}$$

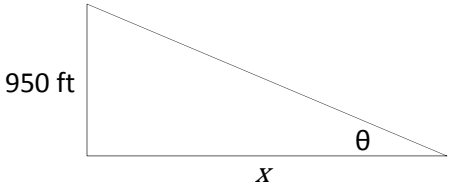
$$So, \quad adj = x, \quad hyp = 1$$

$$From\ Pythagorean\ Theorem, \quad opp = \sqrt{1 - x^2}$$

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

Applications

4. Samantha measures the angle of elevation, θ, from where she is standing to a plane flying overhead. The plane remains at a constant height of 950 feet. Write an equation that relates θ to the horizontal distance, *x*, from Samantha's location to the plane.



$\boldsymbol{\theta = \tan^{-1}\left(\frac{950}{x}\right)}$

***Target 8C**: I can graph and solve problems involving composition and combinations of trigonometric functions.*

Calculators Allowed

5. Will the given function result in a sinusoidal function, and if it does, what is the period of the function? Explain how we can tell if the function is a sinusoid by just looking at the equation.

a) $y = 2\cos 2x + 3\sin 2x$

This will be a sinusoidal function because it is the sum of two sinusoids that have the same period.

b) $y = 3\tan 3x + 4\sin 6x$

This will not be sinusoidal because it is not a sum of sinusoids

c) $y = 4\sin 4x - 4\cos 2x$

This will not be sinusoidal because the periods are not the same.

6. State the domain and range of the functions

$y = (\cos x)^3$

Domain: $(-\infty, \infty)$

Range: $[-1, 1]$

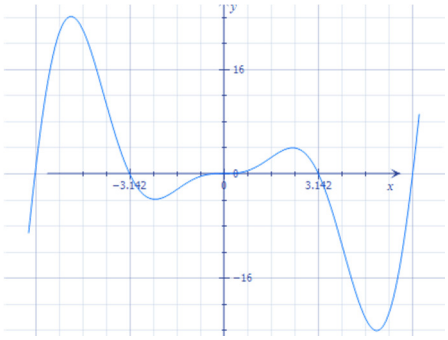
$y = -|\sec x|$

Domain: $\boldsymbol{x \neq \frac{\pi}{2} + \pi n}$

Range: $(-\infty, -1]$

7. Sketch the graph the function $y = x^2 \sin x$
for $-2\pi \leq x \leq 2\pi$. State whether or not the function appears to be periodic. Explain.

This function is not periodic because it will continue to expand due to the dampening factor of x^2



8. What is the dampening factor of in the function $y = x^2 \sin x$? $\_x^2$

Explain how this factor affects the shape of the graph.

The function is bounded above by $y = x^2$ and below by $y = -x^2$.