Spring 2025 Laird Homework 5

Question 1

(A) Find the exact value of $\sin^{-1}(1/2)$.

(B) Find the exact value of $\cos^{-1}(1/2)$.

(C) Find the exact value of $\tan^{-1}(1)$.

(D) Find the exact value of $\sin^{-1}(-1/2)$.

Question 2

A ladder of length 10 feet leans against a vertical wall. The bottom of the ladder is 6 feet from the base of the wall.

(A) Use an inverse trigonometric function to find the angle (in radians, rounded to 4 decimal places) that the ladder makes with the ground. You ought to use a calculator to help you.

Question 3

(A) Find the domain of the function $f(x) = \cos^{-1}(3x - 2)$.

(B) Find the range of the function $f(x) = \cos^{-1}(3x - 2)$.

Question 4

Let $f(x) = 4\sin\left(\frac{x}{3}\right)$ for $-\frac{3\pi}{2} \leq x \leq \frac{3\pi}{2}$

(A) Find the inverse function, $f^{-1}(x)$.

(B) Specify the domain of $f^{-1}(x)$.

Question 5

Let $h(x) = 2\tan\left(\frac{x}{4}\right)$ for $2\pi < x < 6\pi$

(A) Find the inverse function, $h^{-1}(x)$.

(B) Specify the domain of $h^{-1}(x)$.

Question 6

(A) Find the domain of the function $f(x) = \sin(\sin^{-1}(x))$.

(B) Find the range of the function $f(x) = \sin(\sin^{-1}(x))$.

(C) Find the domain of the function $f(x) = \sin^{-1}(\sin(x))$.

(D) Find the range of the function $f(x) = \sin^{-1}(\sin(x))$.

(E) Why do parts B and C not have the same solution?

Question 7

(A) Complete the following: $\frac{1}{\cos(\theta)} =$ _____

(B) Complete the following: $\frac{1}{\sin(\theta)} =$ _____

(C) Complete the following: $\frac{1}{\tan(\theta)} =$ _____

Question 8

(A) Simplify the expression $\sec^2(x) - \tan^2(x)$.

Question 9

(A) Find all values of x in the interval $[0, 2\pi]$ that satisfy the equation $\csc(x) = 2$.

Question 10

(A) Find all values of x in the interval $[0, 2\pi]$ that satisfy the equation $\sec(x) = -2$.

Question 11

(A) Find the exact value of $\sec(\cos^{-1}(1/3))$ without using a calculator.

Question 12

(A) Find all vertical asymptotes of the function $f(x) = \csc(x)$ on the interval $[3\pi, 5\pi]$.

Question 13

(A) Find all vertical asymptotes of the function $f(x) = 2 * \csc(\frac{\pi}{3}x)$ on the interval $[3\pi, 5\pi]$.

Question 14

(A) What is the domain of the function $f(x) = \sec(\frac{1}{3}(x - \frac{\pi}{4}))$?

Question 15

(A) What is the domain of the function $f(x) = \csc(\frac{1}{3}(x - \frac{\pi}{4}))$?

Question 16

(A) What is the domain of the function $f(x) = \cot(\frac{1}{3}(x - \frac{\pi}{4}))$?

Question 17

(A) What is the range of the function $f(x) = \frac{1}{2} * \csc(\pi(x + 10)) - 2$?

Question 18

(A) Sketch a graph with two functions: $f(x) = \sin(x)$ for $0 \le x \le 2\pi$, and $g(x) = \csc(x)$ for $0 \le x \le 2\pi$. Clearly label all asymptotes and key points.