Trigonometry Problem Set

for Class

Rex

1. **Evaluate the following expression.**

$$\tan(\cos^{-1}(\frac{2}{5}))$$

The exact value of the expression is:

$$\frac{\sqrt{21}}{2}$$

2. **Which of the following is equivalent to** $\tan(\theta)\csc(\theta)\sin(\theta)$ **for all values of** θ **for which** $\tan(\theta)\csc(\theta)\sin(\theta)$ **is defined?**

   - $\csc(\theta)$
   - $\sin(\theta)$
   - $\tan(\theta)$
   - $\cot(\theta)$

The equivalent expression is:

$$\tan(\theta)$$

3. **Simplify the expression** $\sin^{-1}(\tan(\frac{9\pi}{4}))$, **where the angle is measured in radians.**

   The simplified expression is:
   $$\frac{\pi}{2}$$

4. **On the domain of** $[-2\pi, 0)$, **for what value(s) of** x **will** $\sin(-x) = \csc(-x)$**?**

   Enter your answer as an equation, $x = a$. If there is more than one answer, separate each equation with a comma, $x = a, x = b$.

   The values for which the equation holds are:

   $$x = -\frac{3\pi}{2}, x = -\frac{\pi}{2}$$

5. **Solve the following equation for** θ **on the interval** $[0, 2\pi)$**:**

$$5\sqrt{3}\tan(\theta) - 4 = 1$$

List the angles separated by commas if there are multiple answers, e.g. $\frac{\pi}{3}, \frac{\pi}{2}$.

The solutions to the equation are:

$$\theta = \frac{\pi}{6}, \frac{7\pi}{6}$$

6. **Simplify the expression** $\tan(\sin^{-1}(-\frac{12}{37}))$**.**

The simplified expression is:

$$-\frac{12}{35}$$

7. **Determine a point not in the domain of the function** $f(x) = -\frac{\cot(x)}{4}$ **within the interval** $-2\pi < x < 2\pi$.
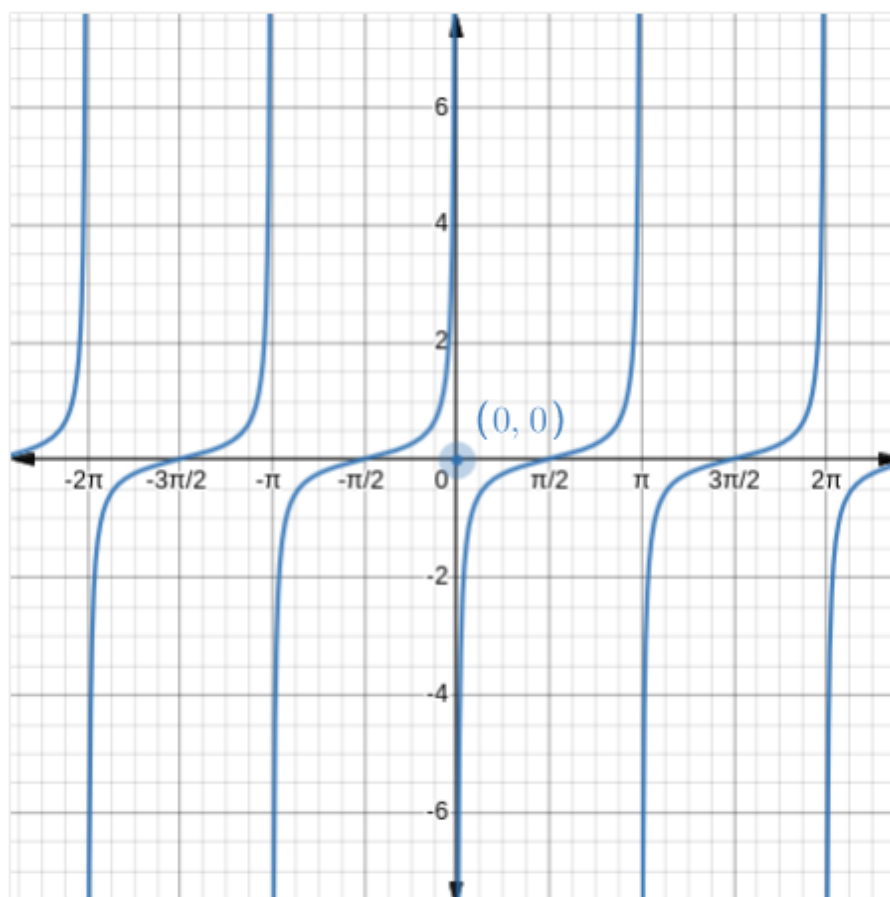

Figure 1: Graph of the function $f(x) = -\frac{\cot(x)}{4}$

The function $f(x) = -\frac{\cot(x)}{4}$ is undefined where $\cot(x)$ is undefined. The cotangent function is the reciprocal of the tangent function, which is undefined where the tangent function is zero, i.e., at multiples of π. Therefore, the points where $f(x)$ is undefined are at $x = k\pi$ for any integer k.

In the interval $-2\pi < x < 2\pi$, the values for k that satisfy $x = k\pi$ are $k = -1, 0, 1$. Thus, the points not in the domain are:

$$x = -\pi, 0, \pi$$

However, since the interval is open (does not include the endpoints), we exclude $x = -2\pi$ and $x = 2\pi$ from our consideration. Hence, the points not in the domain of $f(x)$ within the given interval are $x = -\pi$ and $x = \pi$.

The points not in the domain of $f(x)$ are:

$$x = -\pi, \pi$$

8. **Solve for θ if $16\sin(\theta) + 11 = 27$ and $0 \leq \theta < 2\pi$.**

The solution to the equation is:
$$\theta = \frac{\pi}{2}$$

9. **On the graph of $f(x) = \sec(x)$ and the interval $[0, 2\pi)$, for what value(s) of x does $f(x) = -\sqrt{2}$?**

Enter your answer as an equation, $x = a$. If there is more than one answer, separate each equation with a comma, $x = a, x = b$.

The values for which the equation holds are:

$$x = \frac{3\pi}{4}, x = \frac{5\pi}{4}$$

10. **Solve the following equation for θ on the interval $[0, 360°)$:**

$$2\sec(\theta) - 4 = -2$$

Enter your answer as an equation, $x = a$. If there is more than one answer, separate each equation with a comma, $x = a, x = b$.

The solution to the equation is:

$$\theta = 0°$$