AIME Problems on Trigonometry:

The following questions are very challenging questions from the AIME contest. All of the following problems below are to be solved without using a calculator.

1. Find the value of the following: $10\cot\left(\cot^{-1}3+\cot^{-1}7+\cot^{-1}13+\cot^{-1}21\right)$

2. Find the minimum value of $\frac{9x^2\sin^2 x+4}{x\sin x}$ within the domain of $0<x<\pi$

3. Let "a, b, c" be three sides of a triangle, and let α,β,γ, be the angles opposite them. If $a^2+b^2=1989c^2$, then find the value of $\frac{\cot\gamma}{\cot\alpha+\cot\beta}$

4. How many real numbers "x" satisfy the equation: $\frac{1}{5}\log_2 x=\sin(5\pi x)$?

5. Suppose that $\sec x+\tan x=\frac{22}{7}$ and that $\csc x+\cot x=\frac{m}{n}$, where $\frac{m}{n}$ is in lowest terms. Find the value of m+n.

6. Given that $\left(1+\sin t\right)\left(1+\cos t\right)=\frac{5}{4}$ and $\left(1-\sin t\right)\left(1-\cos t\right)=\frac{m}{n}-\sqrt{k}$, where “k”, “m”, and “n” are positive integers with “m” and “n” relatively prime. Find the value of K + m + n.

7. Find the smallest positive integer solution to $\tan 19x^\circ=\frac{\cos 96^\circ+\sin 96^\circ}{\cos 96^\circ-\sin 96^\circ}$

8. Let $x=\frac{\sum_{n=1}^{44}\cos n^\circ}{\sum_{n=1}^{44}\sin n^\circ}$. What is the greatest integer that does not exceed 100*x*?

9. Given that $\sum_{k=1}^{35}\sin 5k=\tan\frac{m}{n}$, where angles are measure in degrees, and “m” and “n” are relatively prime positive integers that satisfy: $\frac{m}{n}<90$. Find the vale of m + n

10. Find the least positive integer “n” such that:

$$\frac{1}{\sin 45^\circ \sin 46^\circ}+\frac{1}{\sin 47^\circ \sin 48^\circ}+\ldots..+\frac{1}{\sin 133^\circ \sin 134^\circ}=\frac{1}{\sin n^\circ}$$