

Problem 9. If $\theta \neq \frac{\pi}{2} + \pi k$, $k = 0, \pm 1, \pm 2, \pm 3, \dots$, then $\tan \theta$ is defined and $\sin^2 \theta \leq \tan^2 \theta$. In fact for such θ and any positive integer n ,

$$\sin^2 \theta + \sin^4 \theta + \sin^6 \theta + \cdots + \sin^{2n} \theta \leq \tan^2 \theta.$$

Prove this inequality.

Solutions due by 12:00 noon, Monday, March 23.