

Let $S = \left\{ 1^{\frac{1}{\sin^2 x}} + 2^{\frac{1}{\sin^2 x}} + \dots + (n)^{\frac{1}{\sin^2 x}} \right\}^{\sin^2 x}$

$$\left(1^{\frac{1}{\sin^2 x}} + 1^{\frac{1}{\sin^2 x}} + \dots + (1)^{\frac{1}{\sin^2 x}} \right)^{\sin^2 x} \leq S \leq \left(n^{\frac{1}{\sin^2 x}} + (n)^{\frac{1}{\sin^2 x}} + \dots + (n)^{\frac{1}{\sin^2 x}} \right)^{\sin^2 x}$$

take limit

$$\lim_{x \rightarrow 0} \left[(n \cdot 1)^{\frac{1}{\sin^2 x}} \right]^{\sin^2 x} \leq \lim_{x \rightarrow 0} S \leq \left(n \cdot n^{\frac{1}{\sin^2 x}} \right)^{\sin^2 x}$$

$\Rightarrow$

$$1 \leq \lim_{x \rightarrow 0} S \leq 10$$

option (b), (c) & (d) discarded

option (a) is correct