

MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 5 - FEBRUARY 2009
ROUND 3 TRIG: IDENTITIES AND/OR INVERSE FUNCTIONS

ANSWERS

A) (_____ , _____)

B) _____

C) (_____ , _____)

A) The numerical value of $\csc(2\text{Arc cot } 4)$ may be represented as a simplified ratio of integers $\frac{A}{B}$, where $B > 0$. Determine the ordered pair (A, B) .

B) Find all values of x , where $0^\circ \leq x < 360^\circ$, that satisfy

$$\frac{\sin 36^\circ \sin 78^\circ + \cos 36^\circ \sin 12^\circ}{\cos 72^\circ \sin 66^\circ + \sin 72^\circ \sin 24^\circ} = \tan x^\circ$$

C) For some constant **$B < 0$** , $x = 135^\circ$ is a solution of

$$\tan \left(\text{Arc sin} \left(-\frac{2}{\sqrt{5}} \right) - \text{Arc cos } B \right) = \cot(180^\circ + x) .$$

The exact simplified value of B may be expressed in the rationalized form $\frac{P\sqrt{Q}}{Q}$.

Determine the ordered pair of integers (P, Q) .