

MASSACHUSETTS MATHEMATICS LEAGUE

JANUARY 2006

ROUND 3 TRIG: EQUATIONS WITH FEW SOLUTIONS

\*\*\*\*\* NO CALCULATORS ON THIS ROUND \*\*\*\*\*

ANSWERS

A) \_\_\_\_\_

B) \_\_\_\_\_°

C) \_\_\_\_\_

---

A) Find the sum of all  $x$ ,  $0 \leq x < 2\pi$  for which  $\sin(2x) = \cos(x)$

B) Find all  $x$ ,  $0^\circ \leq x < 360^\circ$ , for which  $\frac{\tan(180 - x)}{\sin x} = 2$ .

C) Find the exact sum of the five smallest positive solutions in radians to

$$\sec^2\left(\frac{x}{6}\right) + \sqrt{3} \tan\left(\frac{x}{6}\right) = \sqrt{3} + \tan\left(\frac{x}{6}\right) + 1$$