MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 6 – MARCH 2013
ROUND 3 TRIGONOMETRY: OPEN

ANSWERS

A) _____ °

B) _____

C) _____ °

******* NO CALCULATORS IN THIS ROUND *******

A) The expression $\tan x - \sin x$ is evaluated for $x = 15°, 30°, 45°, 60°, 75°$.
For which of these values is the value of $\tan x - \sin x$ a minimum?

B) In ΔABC, $\cos A = \frac{13}{20}$ and $\cos C = \frac{37}{40}$. Compute the measure of B in degrees.
If necessary, write an expression in terms of $Arc\cos n$.

C) Given: $\begin{vmatrix} \cos x & \sin x \\ \sin y & \cos y \end{vmatrix} = \frac{1}{2}$ and $\begin{vmatrix} \cos x & -\sin x \\ \sin y & \cos y \end{vmatrix} = \frac{\sqrt{2}}{2}$
In degrees, compute the smallest positive value of x for which these conditions hold.

Note: $\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$.

FYI: This expression $\begin{vmatrix} a & b \\ c & d \end{vmatrix}$ is called the determinant of the matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$.