

MASSACHUSETTS MATHEMATICS LEAGUE

MARCH 2005

ROUND 7: TEAM QUESTIONS

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

ANSWERS

A) _____ D) _____ hrs _____ mins

B) _____ E) _____

C) _____ F) _____

A) Find all pairs (x, y) for which $\begin{vmatrix} 1 & 2 \\ 3 & x \end{vmatrix} = \begin{vmatrix} x & 1 \\ 0 & 2 \\ 1 & 0 \\ x \end{vmatrix} = \begin{vmatrix} 3 & y \\ 1 & 2 \end{vmatrix}$

B) If $2^{x+y} = 4^{w+y} = 8^{x-w-2} = 16^{x+y-w-1}$ evaluate wxy .

C) If r , s , and t are the zeroes of $f(x) = 3x^3 - 39x^2 + 120x - 97$ find $r^2 + s^2 + t^2$

D) Marty's Masons charge \$150 plus \$60 an hour to build stonewalls while Bill's Builders charge \$350 plus \$45 an hour. For my small job Marty's cost was only 80% what Bill would have charged, but for my large job Bill's cost was only 80% of what Marty would have charged. Find the total time needed for the two jobs combined- answer in hours and minutes.

E) In $\triangle ABC$ given $AB = 8$, $AC = 14$, and median $AD = 7$ find BC .

F) Find the last two digits of 3^{1000}