MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 2 - NOVEMBER 2009
ROUND 5 TRIG: FUNCTIONS OF SPECIAL ANGLES

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

ANSWERS

A) (_____ , _____ , _____)

B) _____

C) _____

A) In simplest form, $(\tan 240° + \tan 405°)^3 = A + B\sqrt{C}$. Determine the ordered triple (A, B, C).

B) For the purpose of this question, suppose special angles denote angles belonging to the 30° family, 45° family, 60° family or the quadrantal family $(0° + 90k)$.
Compute $\tan(x)$ given that $2\tan(x) = 3\cot(x) - 1$ and x is not a special angle.

C) In ΔABC, $m\angle C = m\angle D = 90°$, $AB = 4$, $m\angle BAC = 30°$ and $BC = EC$.
Find BD in simplified radical form.