MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 1 - OCTOBER 2007 SOLUTION KEY

Round 6

A) $\frac{22}{7} - \frac{314}{100} = \frac{22(100) - 314(7)}{7(100)} = \frac{2200 - 2198}{700} = \frac{1}{350} \rightarrow n = \underline{\mathbf{350}}$

B) $\frac{3A + 5B}{4B - 2A} = 2 \rightarrow 8B - 4A = 3A + 5B \rightarrow \frac{B}{A} = \frac{7}{3}$ Then $\frac{2A - 3B}{A} = 2 - 3\left(\frac{B}{A}\right) = 2 - 7 = \underline{\mathbf{-5}}$

C) The delivery period of 30 days consists of 4 full weeks and 2 days.
The day of the week on which the first of the month falls is the same as the 29^{th} day.
To maximize the cost, the 29^{th} day must fall on a Sunday, adding a cost of 75¢ for the last two days. (The other possible costs for the last two days are: 45¢, 50¢ and 70¢)
Thus, the maximum cost will be 4[5(25) + 20 + 50] + 75 = **855**
If the first day of the month falls on a Sunday, then the first Thursday is the **5**th. → **(5, 855)**