MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 1 - OCTOBER 2014
ROUND 4 ALG 1: FRACTIONS & MIXED NUMBERS

ANSWERS

A) _____

B) _____

C) _____

A) For some positive integer x, each term in the sum $\frac{60}{x}+\frac{60}{x+1}+\frac{60}{x+2}+\frac{60}{x+3}+\frac{60}{x+4}$ is an integer. Compute the minimum value of this sum.

B) It has long been a marathoner's dream to be the first to break the 2 hour barrier for this 26.2 mile race. Assume a marathon is exactly 26.2 miles and that breaking the 2 hour barrier means by at least 1 second. A runner averaging 4 minutes and 35 seconds per mile would miss breaking the 2 hour barrier by k seconds, where k is an integer. Compute k.

C) Find an equivalent simplified expression for $\frac{8x^2\left[4+\left(\frac{x}{2}-\frac{2}{x}\right)^2\right]}{\left(x^2+4\right)^2}$, given $x \neq 0$.