

MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 5 – FEBRUARY 2007
ROUND 6 ALG 2: SEQUENCES AND SERIES

ANSWERS

A) _____

B) _____

C) _____

- A) The symbol Σ in mathematics represents a summation, the addition of several terms of a specific type. For example, $\sum_{k=1}^{k=4} k^2 = 1^2 + 2^2 + 3^2 + 4^2 = 30$.

Evaluate: $\sum_{k=2}^{k=6} (3k - 2)$

- B) Let $t_1 = (2^{-1} + 2^{-2} + 2^{-3} + \dots)$, $t_2 = (3^{-1} + 3^{-2} + 3^{-3} + \dots)$, ... $t_n = ((n+1)^{-1} + (n+1)^{-2} + (n+1)^{-3} + \dots)$
Determine the minimum number of terms that must be added so that the sum exceeds 2.

- C) The harmonic mean of nonzero numbers a and b is defined as $\frac{2ab}{a+b}$.

Given a sequence 1, x , y , 2 such that x is the harmonic mean between 1 and y and y is the harmonic mean between x and 2. What is the sum of x and y ?