MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 5 - FEBRUARY 2016
ROUND 6 ALG 2: SEQUENCES AND SERIES

ANSWERS

A) _____

B) (_____ , _____ , _____)

C) _____

A) Each term in a sequence (except the first) has a value defined in terms of the previous term. Specifically, the rule is $a_n = a_{n-1}\left(a_{n-1}+1\right)$. If $a_1 = 1$, how many terms in this sequence have a value less than 100?

B) There are two different arithmetic progressions of three numbers a_1, a_2, a_3, each of which has the following properties:

- $a_1 + a_2 + a_3 = 30$.
- If 2 is subtracted from the first number, 4 from the second number and 5 from the third number, a geometric progression results.

Compute the ordered triple $\left(a_1, a_2, a_3\right)$, where a_1 is as small as possible.

C) Given: square *ABCD*
A set of nested squares is drawn inside square *ABCD*, where *AB* = 100 cm. The vertices of each nested square are midpoints of the sides of the preceding square, and circle *O* is inscribed in one of the right triangles formed by the 4th and 5th squares as shown. Compute the radius of the circle inscribed in one of the right triangles formed by the 8th and 9th squares.