Bay Area Mathematical Olympiad
and Mathematical Circles
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Berkeley Math Circle
Monthly Contest 2
Due October 26, 2003

1. Solve

$$2\sqrt{1+x\sqrt{1+(x+1)\sqrt{1+(x+2)\sqrt{1+(x+3)(x+5)}}}}=x$$

2. The circle ω passes through the vertices A and B of a unit square $ABCD$. It intersects AD and AC at K and M respectively. Find the length of the projection of KM onto AC.

3. A king is placed in the left bottom corner of the 6 by 6 chessboard. At each step it can either move one square up, or one square to the right, or diagonally - one up and one to the right. How many ways are there for the king to reach the top right corner of the board?

4. *Updated* In the triangle ABC the angle B is not a right angle, and $AB : BC = k$. Let M be the midpoint of AC. The lines symmetric to BM with respect to AB and BC intersect AC at D and E. Find $BD : BE$.

5. One marks 16 points on a circle. What is the maximum number of acute triangles with vertices in these points?