1. In a town, $\frac{2}{3}$ of the men are married to $\frac{3}{4}$ of the women. What fraction of the adult population is married?

2. The numbers 1 through 100 are assigned sequentially to the blocks of a 10 by 10 square as indicated.

Then minus signs are attached to half of them, in such a way that in each row and in each column, half of the numbers are positive and half are negative. Show that the sum of the resulting 100 numbers is independent of how the minus signs are distributed and find this sum.

3. You are given 2 marbles and the task of determining the highest story of a 100 story building from which you can drop a marble without breaking it. Find a scheme that is guaranteed to give the answer in the fewest number of drops.

4. Let $A_1, A_2, A_3, A_4, A_5, A_6, A_7$ be a regular heptagon. Prove that

\[
\frac{1}{A_1 A_2} = \frac{1}{A_1 A_3} + \frac{1}{A_1 A_4}
\]

5. Write an essay of 500 to 700 words (complete with a bibliography) on an application of mathematics to medicine.