

Problem 3. (Does not have anything to do with geometry, only with deduction)

A terrible despot captured several wise men and women (probably geometers). He decided to check how smart they are. In past, this despot was a professor of mathematics (actually logician), so he told them the following:

"I will put a hat on each of you. I have hats of two types: white and black. You will see the hats on other people, but you won't see your hat. Then I will ask each of you a question, what color is your hat? Those of you who answer correctly will get 10 pounds of gold, those of you who give a wrong answer will lose their head. But I am a very kind man so you can honestly admit that you don't know the answer. In this case I only cut one of your fingers.

Then he ordered to bring the hats and very wise men and women noticed that he has the same number of white and black hats, but the number of hats of one color is less than the number very wise men and women. They also know that everybody in their group is really very smart, so if it is possible to be 100% sure they will answer the question. If it is impossible to be 100% sure, they won't gamble between gold and losing their head, they just say "I don't know".

a) Assume that there are three people in your group and you are one of them. You see a black and white hat. The guy with the white hat was asked and he did not know. What color is your hat?

b) There are four people in your group. You see two black and one white hat. People with black hats were asked and they did not know. Now, it is your turn. What color is your hat?

Problem 4. Prove that a composition of isometries is an isometry. Write the proof as I did when was proving Theorems 3 and 5. Divide your page in two half and use one for statements and the other for reasons why they are true.