

UWO Math 2124 Fall 2019
Introduction to Mathematical Problems
Instructor: Rasul Shafikov
Handout: Sept 5

Example 1:

Suppose a standard 8×8 chessboard has two diagonally opposite corners removed, leaving 62 squares. Is it possible to place 31 dominoes of size 2×1 so as to cover all of these squares?

Example 2: (Textbook, p. 2)

A census-taker knocks on a door, and asks the woman inside how many children she has and how old they are.

"I have three daughters, their ages are whole numbers, and the product of the ages is 36," says the mother.

"That's not enough information," responds the census-taker.

"I'd tell you the sum of their ages, but you'd still be stumped."

"I wish you'd tell me something more."

"Okay, my oldest daughter Annie likes dogs."

What are the ages of the three daughters?

Example 3: (Textbook, p.6)

A monk climbs a mountain. He starts at 8 AM and reaches the summit at noon. He spends the night on the summit. The next morning, he leaves the summit at 8 AM and descends by the same route that he used the day before, reaching the bottom at noon. Prove that there is a time between 8 AM and noon at which the monk was at exactly the same spot on the mountain on both days. (Notice that we do not specify anything about the speed that the monk travels. For example, he could race at 1000 miles per hour for the first few minutes, then sit still for hours, then travel backward, etc. Nor does the monk have to travel at the same speeds going up as going down.)

Example 4: (Textbook, p. 7)

You are in the downstairs lobby of a house. There are three switches, all in the "off" position. Upstairs, there is a room with a lightbulb that is turned off. One and only one of the three switches controls the bulb. You want to discover which switch controls the bulb, but you are only allowed to go upstairs once. How do you do it? (No fancy strings, telescopes, etc. allowed. You cannot see the upstairs room from downstairs. The lightbulb is a standard 100-watt bulb.)