

Department of Mathematics
Maths 190 and Maths 190G
Lecture 2 Summary

We consider two main puzzles in Lecture 2:

Example 1: Meanie Genie (Story 1, Chapter 1, The Heart of Mathematics). Alley is given nine identical-looking stones by a genie. The genie tells Alley that eight of the stones weigh the same as each other but the ninth stone is heavier and contains a large diamond. The genie gives Alley a set of balance scales, which can be used only twice. Can Alley use the scales to find the stone with the diamond inside?

This puzzle looks hard at first, and cannot be solved by weighing stones individually. However, if Alley uses the scales first to compare two groups of stones, she can find the diamond with only two weighings. This story shows the usefulness of breaking a hard problem into easier ones: instead of trying to find the diamond immediately, Alley first reduces the choices from nine stones to three stones which makes the problem easier.

Example 2: Fountain of Knowledge (Story 3, Chapter 1, The Heart of Mathematics). Trey wants to measure exactly 8 ounces (240 ml) of juice from a jug full of juice. He has a glass that holds 6 ounces (180 ml) of juice and another glass that holds 10 ounces (300 ml) of juice. The glasses have no markings. Can Trey use these two glasses to get exactly 8 ounces of juice in the 10 ounce cup?

One way to look for an answer to this puzzle is try out some possibilities and look for new information in the outcomes of the different attempts. Trial and error is often a good way to start solving a mathematical puzzle. Do not be afraid to try experiments when solving puzzles.

Before you come to the next lecture: You should spend two or three hours thinking and reading about the ideas presented in the lecture. You should:

- Read Story 1 and Story 3, text §1.1, §1.2
- Try Stories 6 and 9, text §1.1, §1.2
- Read solutions to Stories 1,3,4,5,6,9 in §1.3. Read §1.4.

Other activities you could do if you have time are:

- Use the CD in the back of the textbook to solve the Counterfeit Coin puzzle with some different numbers of coins. Instructions are given when you load the CD. You could also try the Fountain of Knowledge activity on the CD.
- Start Assignment 1. This is due at the end of the second week of lectures.

Handouts given at this lecture:

- Assignment 1
- Lecture 2 Summary

Next lecture: Hairy bodies – prepare for this by reading §2.1 in the text book.