

# Information Theory for Complex Systems

## Introductory puzzle

You have 12 balls, all have the same weight except one that deviates. By using a balance three times you should be able to find the deviating ball, and tell whether it is lighter or heavier. The task is to find this procedure. In the course you will see that an information perspective on this problem may make it easier to find a solution.

Example of balance; you may have any number of balls on each side, and you may assume the weighing to be perfect (equal weights on both sides gives a balanced result).



To get started, you may consider the more easy problem, in which you have nine balls, of which you know that one is heavier but the others identical. Show how to find the heavy one in two measurements using a balance!

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*Updated: December 17, 2001, [Kristian Lindgren](#).*