

Pre-lecture exercises will not be collected for credit. However, you will get more out of each lecture if you do them, and they will be referenced during lecture. We recommend **writing out** your answers to pre-lecture exercises before class. Pre-lecture exercises usually should not take you more than 30 minutes.

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In this pre-lecture exercise, we'll see an example of something subtle that will come up in Lecture 8.

Suppose you are putting  $n$  items into six buckets. You decide to use the following randomized scheme:

1. Roll a 6-sided die.
2. If the die came up  $i$ , put all  $n$  items into bucket  $i$ .

Consider the following two quantities:

- Quantity 1:  $\mathbb{E}[\text{number of items in bucket 1}]$ ,
- Quantity 2:  $\mathbb{E}[\text{number of items that land in the same bucket as item 1}]$ .

While quantities 1 and 2 may seem similar, in fact they have very different values! Using the definition of expectation, compute quantities 1 and 2 and see why they are different.