

The sample space consists of all possible choices for the birthday of each person. Since there are  $n$  persons, and each has 365 choices for their birthday, the sample space has  $365^n$  elements. Let us now consider those choices of birthdays for which no two persons have the same birthday. Assuming that  $n \leq 365$ , there are 365 choices for the first person, 364 for the second, etc., for a total of  $365 \cdot 364 \cdots (365 - n + 1)$ . Thus,

$$\mathbf{P}(\text{no two birthdays coincide}) = \frac{365 \cdot 364 \cdots (365 - n + 1)}{365^n}.$$

It is interesting to note that for  $n$  as small as 23, the probability that there are two persons with the same birthday is larger than  $1/2$ .

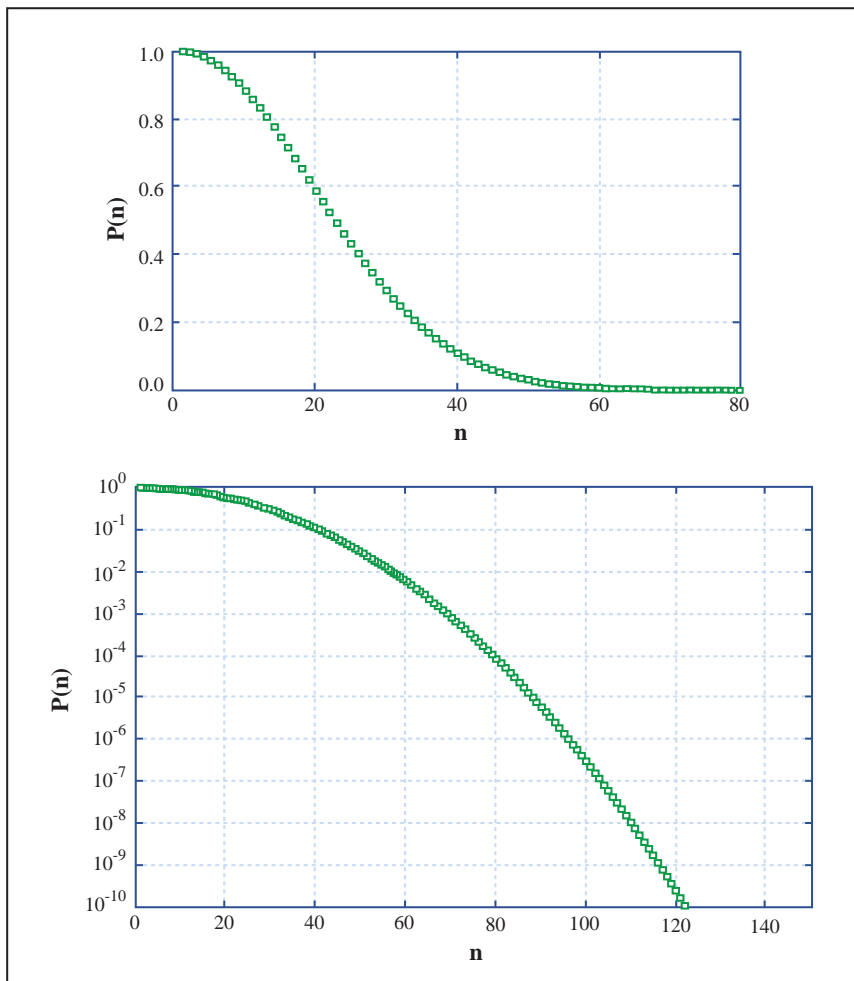


Image by MIT OpenCourseWare.