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2C Probability through Sample Points

[ToC]

C.1 Ex: Batting Orders

1. There are 9 baseball players including John, Jake and Emily. If batting order is made at random, what is the probability that three of them bat in a row?

2. What about the probability that John, Jake, and Emily will bat in a row with that order?

C.2 Ex: Boys and Girls

1. There are 5 boys and 5 girls. If they randomly sit in a line, what is the probability that no two boys and no two girls can sit together?

C.3 Ex: Fake or Real

- A box contains 35 gems, of which 10 are real diamonds and 25 are fake diamonds.
- Gems are randomly taken out of the box, one at a time without replacement for three times.
- What is the probability that exactly 3 fakes are selected?
- How about the probability that exactly 2 fakes are selected?

We must calculate this as

$$P(A) = \frac{\text{number of ways in event A}}{\text{number of total ways}}$$

Since order does not matter in the end, we can count without order.
Or, we can count with order, then disregard the order in the end.

- 35 gems, 10 real and 25 fake. P(exactly 3 fakes)? P(exactly 2 fakes)?

C.4 Ex: Three Kind in a Box

A box contains four 40w bulbs, five 60w bulbs, and six 75w bulbs. Out of 15 total bulbs, 3 are selected randomly at once.

$P($ same rating$) =$

$P($ exactly two 75w$) =$

$P(\text{ one from each rating}) =$