Probability - part 3

date: .... , class: .... , student: ....

1 Exercises

- **Exercise 1:** You *toss* 3 coins: what is the probability of finding 2 "tails" given that the second coin landed on "heads"?

- **Exercise 2:** You toss 4 coins: what is the probability of finding 3 "tails" given that at least one coin landed on "heads"?

- **Exercise 3:** You throw 2 fair dice: what is the probability of obtaining a result between 3 and 6 given that the first die scored 2?

- **Exercise 4:** You throw 3 fair dice: what is the probability of obtaining a result between 8 and 11 given that the first die scored 4?

- **Exercise 5:**[1] Researchers *surveyed* one hundred students on which superpower they would most like to have. The *two-way table* below displays data for the *sample* of students who responded to the *survey*.

Superpower	Male	Female	Total
Fly	30	10	40
Invisibility	12	32	44
Other	10	6	16
Total	52	48	100

Find the probability that the student was male, given the student chose "fly" as their superpower.

- **Exercise 6:** Think of an example (with coins or dice) and *work it out* to show that the relation

$$p(\bar{A}|B) = 1 - p(A|B).$$

is valid.

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[1]This exercise is taken from
https://www.khanacademy.org/math/ap-statistics/probability-ap/
stats-conditional-probability/a/conditional-probability-using-two-way-tables

- **Exercise 7:** Use the conditional probability formula and Venn diagrams to *prove* the following relation:

$$p(A \cup B|C) = p(A|C) + p(B|C) - p(A \cap B|C).$$

How does this formula change if the events A and B are mutually exclusive?

2 Glossary

- toss = lanciare

- survey = sondaggio

- two-way table = tabella a doppia entrata

- sample = campione

- work something out = (in questo contesto) svolgere

- prove = dimostrare