

STAT 2857A – Lecture 5 Examples and Exercises

Example 4.1

According to <http://https://www.colourblindawareness.org/>, colour blindness affects 1 in 12 people assigned to be male at birth and 1 in 200 people assigned to be female at birth. Approximately 48.78% of all babies born in the world are assigned to be female at birth.

- a) Identify the conditional probability(ies) in this statement and define them in terms of the events F a person is assigned to be female at birth and B a person is colour blind.
- b) What is the probability that a randomly selected newborn is female and colour blind/male and colour blind?
- c) What is the probability that a randomly selected newborn is colour blind?
- d) What is the probability that a baby is assigned to be male at birth given that it is colour blind?
- e) What is the probability that someone answers yes to the following statement?

I am colour blind **OR**¹ my birthday falls on an odd numbered day of the month.

Note that there are 187 odd days in the year and 178 even days (ignoring the leap day).

¹We will always use the inclusive or so that the statement is true if one or both are true.

Exercise 4.1

The 2024 US Presidential election will be held on November 5 and provides a lot of opportunity for interesting statistics. Current polls put Kamala Harris in the lead nationally with 48% of the vote versus Donald Trump's 46% (the remaining 6% are undecided or voting for other candidates). However, Kamala's support by state varies from 28% in Utah (population 3,417,734) to 70% in Vermont (population 647,464). The total population of the 50 US states is 334,235,923.

- a) Identify the conditional probabilities defined in this question.
- b) What is the probability that a randomly selected US voter is from Utah and is planning to vote for Kamala Harris?
- c) What is the probability that someone not from Utah plans to vote for Kamala Harris?
- d) Suppose that a randomly selected person is planning to vote for Kamala Harris. Is this person more likely to be from Utah or from Vermont?
- e) What is the key assumption to answering these questions?