

# MATH221 Mathematics for Computer Science

## Tutorial Sheet Week 10 - Autumn 2021

1. How many car number plates are there of the form  $L_1L_2L_3n_1n_2n_3$  where  $L_1, L_2, L_3$  are letters and  $n_1, n_2, n_3$  are numbers? If we restrict the possibilities by insisting that there are no repeats, how many are there now? Repeat this question for number plates of the form  $L_1L_2n_1n_2L_3L_4$ .
2. Currently the U. S. Senate consists of 80 male and 20 female senators. If a committee of 3 senators is formed, what is the probability that it is an all-male committee?
3. Give an example of a relation on  $\mathbb{N} \cup \{0\}$  that is
  - (a) reflexive and transitive, but not symmetric;
  - (b) transitive and symmetric, but not reflexive.
4. On  $\mathbb{R}$ , let the relation  $R$  be defined  $xRy \Leftrightarrow |x - y| \leq 1$ . Prove that  $R$  is not an equivalence relation.
5. On  $\mathbb{R}^2$ , let the relation  $R$  be defined  $(a, b)R(c, d) \Leftrightarrow 2a - b = 2c - d$ . Prove that  $R$  is an equivalence relation. Write 3 elements of  $[(1, 2)]$ .