

Worksheet 1 — Sets and counting

1. (a) Write down any set A of size 5.
(b) What is the formal notation for all sequences of three elements from A ?
(c) How many such sequences are there, exactly?
2. How many binary sequences of length 500 are there?
3. A and B are sets with $|A| = 3$ and $|B| = 4$.
(a) What is the largest size $A \cup B$ could possibly have?
(b) What is the smallest size $A \cup B$ could possibly have?
(c) Repeat for $A \cap B$.
4. A donkey, an ox, a goat, and a tiger need to cross a river. They have a boat that can only hold one animal, so they need to go one at a time. How many different orderings are there?
5. How many sequences of 5 English characters are there?
6. You have 10 good friends, and you want to choose 3 of them to accompany you on a trip. How many groups of three friends can you choose?
7. You have 10 different beer bottles, and you want to line 5 of them up on your mantelpiece. How many different arrangements can you make?