Math 2001 - Assignment 5

Due October 3, 2025

(1) How many lists of length 4 are there with entries from A,. . . , Z if
   (a) repetition is allowed,
   (b) repetition is not allowed,
   (c) repetition is not allowed and the list must contain A,
   (d) repetition is allowed and the list must contain A.

   Solution.
   (a) 4-lists with repetition: 26^4
   (b) 4-lists without repetition: $\frac{26!}{22!} = 358.800$
   (c) Subtract all lists without A from (b): $\frac{26!}{22!} - \frac{25!}{21!}$
   (d) Subtract all lists without A from (a): $26^4 - 25^4$

(2) [1, Section 3.3]: Exercise 2

   Solution: 5 cards off a 52-card deck are lined up in a row. How many line-ups are there with all of the same suit?

   First pick 1 out of 4 suits, then a list (not set) of 5 cards out of 13 of that particular suit

$$\binom{4}{1} \cdot \frac{13!}{8!} = 4 \cdot 13 \cdot 12 \cdot 11 \cdot 10 \cdot 9$$