Homework #2

2.1 In this homework, we will consider "ordinary" decks of playing cards which have 52 cards, with 13 of each of the four suits (Hearts, Spades, Diamonds and Clubs), with each suit having the 13 ranks (Ace, 2, 3, ..., 9, 10, Jack, Queen, King).

(a) How many 5-card hands are there where all the cards have the same suit?
(b) How many 5-card hands are there where all the cards belong to at most two suits?

How many 5-card hands are there where all the cards have at most 2 different ranks?

2.2 How many 8 digit numbers formed from the digits \( \{0, 1, ..., 9\} \) have some digit occurring at least 3 times?

2.3 (a) How many different 5-letter strings can be formed from distinct letters from the word ABRACADABRA.
(b) How many different 5-letter strings can be formed using the letters from the word ABRACADABRA if duplicated letters are allowed but no letter can be used more times than it occurs in the word?

2.4 (a) How many 5-card hands (from an ordinary deck) have at least one card of each suit?
(b) How many 6-card hands have at least one card of each suit?

2.5 (a) In how many different ways can the letters in MISSISSIPPIPOKER be arranged (using all the letters)?
(b) In how many different ways can all the letters in the word supercalifragilisticexpialidocious be arranged?

2.6 Show that the number of subsets of an \( n \)-set \( S \) having an odd number of elements is exactly the same as the number of subsets of \( S \) having an even number of elements (where we assume \( n > 0 \)).