1.3-7 There are $N = 10^4$ possibilities; $|S| = 10^4$. We calculate
\[ \frac{\text{# distinguishable permutations}}{N} \]
a) $= 4! / N = 0.0024$
c) $(4!/2!2!) / N = 0.0006$

1.3-11 Show that
- There are at most 7 games and at least 7 games.
- Let $x$ be the number of games and $A$ wins. Then the number of possibilities is $x^7 C_3$. The answer is twice this number.

1.3-17 There are $N = 52 C_5 = 2,598,960$ poker hands (Example 1.3-9).

- Hand of type 2-2-1.
  - Choose the values for the pairs = $\frac{13 \cdot 12 \cdot 11}{2 \cdot 2 \cdot 7} C_2 = 11$ possibilities.
  - Choose the value for the singleton = 11 possibilities.
  - Choose the suits for the first pair = $4 \cdot C_2 = 4^2$.
  - Choose the suits for the second pair = $4 \cdot C_2 = 4^3$.
  - Choose the suit for the singleton = $C_1 = 1$.
  - Multiply and divide by $N$

\[ p = \frac{13 \cdot 12 \cdot 11 \cdot 4^3 \cdot 4^3 \cdot 4}{52! / 7!} = \frac{123552}{2,598,960} = 0.047539016 \]

The homework is the one posted

1.2 / 9, 10, 12, 13, 17

- you need to work out and explain your answers for full credit.
- use the extra problems solved here for practice.
- read the solved examples in the book
Problem 12

Binomial Formula

\[(A + B)^n = \sum_{k=0}^{n} \binom{n}{k} A^k B^{n-k}\]

(i) \(A = -1, \ B = 1\) gives the answer.

(ii) done in class.

Problem 13

\[\binom{13}{5} \binom{13}{4} \binom{13}{3} \binom{13}{1}\]

(a)

\[\binom{13}{52} \div \binom{13}{13}\]

This explains the rest.

\[\binom{52}{13} = \binom{13 + 13 + 13 + 13 + 13 + 13}{5 + 4 + 3 + 1}\]
Problem 16  Similar with 13

\[ \binom{19}{3} \left( \frac{52-19}{9-3} \right) \]

\[ \frac{52}{9} \leftarrow \text{selections disregarding colors} \]

So: we need three white out of 19 white.

the rest means \( 52 - 19 = \binom{33}{9} \)

(all other colors)

we need to pick

\[ 9 - 3 = 6 \]

\[ \binom{19}{3} \left( \binom{10}{2} \binom{7}{1} \binom{5}{1} \binom{6}{2} \binom{5}{0} \right) \]

\[ \frac{52}{9} \]