

MATH413 HW 1

Due **Feb 5** before class. Just bring it before the class and it will be collected there.

1: How many ways are there to pick a man and a woman who are not husband and wife from a group of n married couples?

2: How many nonempty words can be formed from three A s and five B 's? (*not all letters must be used, any sequence of letters counts as a word*)

3: How many ternary $(0,1,2)$ sequences of length 10 are there without any two consecutive digits **being** the same?
(*Ternary means using digits 0,1,2. Similarly, binary would mean just digits 0,1. No consecutive the same means 11, 22, 00 are the forbidden substrings.*)

4: How many different outcomes are possible when a pair of dice, one red and one white are rolled two consecutive times?

Consider that one roll consists of outcome that is formed by the PAIR of what is on white and red and count the number of outcomes if

A) it is possible to distinguish which roll was first and which was second.

B) it is not possible to distinguish first and second roll. (*Consider that first and second roll are distinguishable as well as the case where they are not. Note that one roll is, which is red and white dices is equivalent to a roll of a dice with 36 sides.*)

5: Construct a perfect cover of an 8-by-8 chessboard with dominoes (1×2) having no fault-line.

(*Fault line is cutting the board but not any domino. See Page 7 in the book and Figure 1.5.*)

6: Construct a pair of orthogonal Latin squares of order 4. (*It means two squares 4×4 filled with numbers $1 \dots 4$.*)

7: Show that there is no magic cube of dimension 2.
(*It means cube $2 \times 2 \times 2$ filled with numbers $1 \dots 8$.*)