Problem Sheet 1

1. Describe each of the following measures of location including their the pros and cons

i Mean

The mean is the point at which the sum of the deviations is 0:

Pros:

* Easy to calculate;
* Uses all the data.

Con:

* Sensitive to extreme values.

ii Median

The median is the middle value of the ordered set of values:

Pros:

* Median gives the center of the data;
* Not sensitive to extreme values.

Con:

* Does not use all the data.

1. Variance

The variance is the spread around the mean:

Pro:

* Takes all data into account.

Cons:

* Hard to interpret;
* Can be influenced by extreme values.

iv Skewness

Skewness is a measure of symmetry of a distribution: Pro

* Takes all data into account;

Con

* Not intuitive.

## Counting

1. How many different combinations of 4 cards can be made for a 52 card deck.

**ANSWER:**

Order **does not** matter

52\*51\*50\*49/(4\*3\*2\*1)

## [1] 270725

# OR  
choose(52,4)

## [1] 270725

Order **does** matter

**ANSWER:**

52\*51\*50\*49

## [1] 6497400

# OR  
factorial(52)/factorial(48)

## [1] 6497400

1. A bank issues bank cards with PINs consisting of 4 digits, each one {0,1,2,…,9}. How many unique PINs are there if
2. Any 4-digit code can be used.

**ANSWER:**

10\*10\*10\*10

## [1] 10000

1. The digits must be different.

**ANSWER:**

Order **does** matter

10\*9\*8\*7

## [1] 5040

1. In a lottery, each ticket has 5 one-digit numbers 0-9 which is not repeated on it. i You win if your ticket has the digits in any order. What are the total number of possible combinations?

**ANSWER:**

Order **does not** matter

choose(10,5)

## [1] 252

10\*9\*8\*7\*6/(5\*4\*3\*2\*1)

## [1] 252

ii You would win only if your ticket has the digits in the required order. What are the total number of combinations?

**ANSWER:**

Order **does** matter

10\*9\*8\*7\*6

## [1] 30240

1. How many different combinations of 6 cards can be made for a 52 card deck if
2. order matters.

**ANSWER:**

Order **does** matter

52\*51\*50\*49\*48\*47

## [1] 14658134400

factorial(52)/factorial(46)

## [1] 14658134400

1. order does not matter

**ANSWER:**

Order **does not** matter

choose(52,6)

## [1] 20358520

52\*51\*50\*49\*48\*47/(6\*5\*4\*3\*2\*1)

## [1] 20358520

1. A poker hand consists of 7 cards:
2. How many different hands are possible, if order does not matter,

**ANSWER:**

Order **does not** matter

choose(52,7)

## [1] 133784560

52\*51\*50\*49\*48\*47\*46/(7\*6\*5\*4\*3\*2\*1)

## [1] 133784560

1. How many hands can be made with at least one king and one queen.

**ANSWER:**

4\*4\*50\*49\*48\*47\*46/(5\*4\*3\*2\*1)

## [1] 33900160

1. In a game of 5 card poker what are the number of different possible hands are there?
2. A hand with a pair

**ANSWER:**

(52\*3)/(2\*1)\*48\*47\*46/(3\*2\*1)

## [1] 1349088

aa)A hand with a only pair

**ANSWER:**

(52\*3)/(2\*1)\*48\*44\*40/(3\*2\*1)

## [1] 1098240

b)A hand with two pair

**ANSWER:**

((52\*3)/(2\*1)\*48\*3/(2\*1))/2\*44/1

## [1] 123552

c)A hand with Three of a kind

**ANSWER:**

((52\*3\*2)/(3\*2\*1)\*48\*3/(2\*1))

## [1] 3744

d)A hand with a Flush (all the same suit)

**ANSWER:**

((52\*12\*11\*10\*9)/(5\*4\*3\*2\*1))

## [1] 5148