ProblemSheet1a

Problem Sheet 1a

Measures of Location

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

i Mean

To get the mean (or average), you have to sum all the elements of a dataset and divide by the number of elements on it. The mean can be represented by the following formula:

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

An example could be used to calculate the mean of the salary hour from the Merit Market company editors

```
editorsSalaries=c(12, 10,11, 12,9,13,12)


mean(editorsSalaries)
```

```
## [1] 11.28571
```

Pros:
1. Easy to calculate (for small sets, you can do the maths in your head)
2. Is well understood, you can probably say to most of people: I sleep 7 hours per day on average.

Cons:
It's sensitive to extreme values. Looks what happens for the mean salary from Merit Market editors when mister Merit Jr. becomes 18 and starts working on the department:

```
meritJrGenerousSalary <- 90
editorsSalaries=c(12, 10,11, 12,9,13,12,meritJrGenerousSalary)

mean(editorsSalaries)
```

```
## [1] 21.125
```

Suddenly, you can't rely on the mean to answer questions like: how much me, Mr. Norman NoMerit could make per hour working on that market agency

ii Median

Median is the value in the middle of a list of values. If the list has an even number of values, it's the mean between the two in the middle.

Pros: not as sensitive as mean for extremes. Using the previos salaries example, median still a pretty good measure to answer how much mister Mr. Norman NoMerit would expect to make joining Merit Market editors group:

```
editorsSalaries=c(12, 10,11, 12,9,13,12)


median(editorsSalaries)
```

```
## [1] 12
```

```
meritJrGenerousSalary <- 90
editorsSalaries=c(12, 10,11, 12,9,13,12,meritJrGenerousSalary)

median(editorsSalaries)
```

```
## [1] 12
```

iii Variance

iv Skewness

Counting

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

3. A bank issues bank cards with PINs consisting of 4 digits, each one {0,1,2,. . . ,9}. How many unique PINs are there if

i. Any 4-digit code can be used.

ii. The digits must be different.

4. 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?

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

5. How many different combinations of 6 cards can be made for a 52 card deck if

i) order matters.

ii) order does not matter

6. A poker hand consists of 7 cards:

i) How many different hands are possible, if order does not matter,

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

7. In a game of 5 card poker what are the number of different possible hands are there?

a) A hand with a pair

b) A hand with two pair

c) A hand with Three of a kind

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