

## Project 1

### Problem 1

Thirty-five piglets were weighed at birth, and the following weights (kg) were obtained:

Problem 1					
1.0	1.3	2.0	1.5	1.5	1.4
1.6	1.8	1.6	1.5	1.4	1.3
1.3	1.1	1.2	1.2	1.2	1.2
1.2	1.5	1.6	1.4	1.0	1.1
1.9	1.7	1.6	1.7	1.7	1.4
1.7	1.1	1.2	1.5	1.5	

For this data calculate by hand


- Mode
- Median
- Arithmetic mean
- Range
- Variance
- Standard Deviation
- Standard error

### Mode

**Mode = 1.2 and 1.5**

- These are the numbers occur in highest frequency

## Median

	X (sample)	U (mean)	(x-u) <sup>2</sup>
	1	1.4	0.2
	1	1.4	0.2
	1.1	1.4	0.1
	1.1	1.4	0.1
	1.1	1.4	0.1
	1.2	1.4	0.1
	1.2	1.4	0.1
	1.2	1.4	0.1
	1.2	1.4	0.1
	1.2	1.4	0.1
	1.2	1.4	0.1
	1.3	1.4	0.0
	1.3	1.4	0.0
	1.3	1.4	0.0
	1.4	1.4	0.0
	1.4	1.4	0.0
Median	 1.4	1.4	0.0
	1.4	1.4	0.0
	1.5	1.4	0.0
	1.5	1.4	0.0
	1.5	1.4	0.0
	1.5	1.4	0.0
	1.5	1.4	0.0
	1.5	1.4	0.0
	1.5	1.4	0.0
	1.6	1.4	0.0
	1.6	1.4	0.0
	1.6	1.4	0.0
	1.6	1.4	0.0
	1.7	1.4	0.1
	1.7	1.4	0.1
	1.7	1.4	0.1
	1.7	1.4	0.1
	1.8	1.4	0.1
	1.9	1.4	0.2
	2	1.4	0.3
Sum	49.9	49.9	2.186857

The median is 1.4 as it occurs in the middle of the data set

- $1.4 + 1.4 / 2 = 1.4$

### Arithmetic mean

The *arithmetic mean* of a sample of  $n$  numbers  $y_1, y_2, \dots, y_n$  is:

$$\bar{y} = \frac{\sum_i y_i}{n}$$

- **Sum = 49.9**
- **Number = 35**
- **Mean = 1.4**

### Variance

$$s^2 = \frac{\sum (x - \bar{x})^2}{n - 1}$$

sum of  $(x-u)^2/n-1 = 2.2/34 = 0.065$

### Standard deviation of population

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

The standard deviation is the square root of the variance

$$s = \sqrt{0.065} = 0.25$$

## Standard error

Standard Error of the mean refers to the average distance between the expected value which is the population mean and the mean of each individual sample. Standard Error of the mean helps us to understand that how much our expected mean is close to the actual population mean i.e. how much of the actual mean does my expected value represents.

Standard Error of the mean can be found out by dividing the population's standard deviation or the sample estimate of the standard deviation (i.e. the standard deviation of a sample ) with the square root of the sample size (for example the number of individuals in the sample).

Formula for Standard Error of Mean is-

$$SE_{\bar{x}} = \frac{s}{\sqrt{n}}$$

$$SE = 0.25 / \sqrt{35} = 0.04$$

Subtract the standard error from the mean and record that number = 1.357748497

Add standard error to mean = 1.442251503

- **SE of mean = 1.4 +/- 0.04**
- **or SE is 1.36 to 1.44**