

Lab 1

Measurement, Standard Deviation & Error

Drop an object from a height of 1 meter 25 times and measure the falling time with your stopwatch. Your cell phone has stop watch. Record those 25 data (falling time) in the column labeled by x_i . Then find summation of all data which is $\sum x_i$. Find average or mean \bar{x} . Then find the quantity $(x_i - \bar{x})^2$ and record those values in the rightmost column. Find summation of the quantities $(x_i - \bar{x})^2$ as $\sum (x_i - \bar{x})^2$. And follow the instruction.

Data Table (Sample Calculation)

Trials	Data x_i	Mean \bar{x}	Data - mean $x_i - \bar{x}$	$(x_i - \bar{x})^2$
1	0.44	2.14/5 =0.428	0.44-0.428 = 0.012	$(0.012)^2 = 0.000144$
2	0.41		0.41-0.428 = -0.018	$(-0.018)^2 = 0.000324$
3	0.39		0.39-0.428 = -0.038	$(-0.038)^2 = 0.001444$
4	0.47		0.47-0.428 = 0.042	$(0.042)^2 = 0.001764$
5	0.43		0.43-0.428 = 0.002	$(0.002)^2 = 0.000004$
6	Add all of			Add all of those above
7	Those and write			And down the SUM
8	Down the SUM			at the bottom
9	At the bottom			
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
	$\sum x_i = 2.14$			$\sum (x_i - \bar{x})^2 = 0.00368$

Standard Deviation

$$s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{N}} = \sqrt{\frac{0.00368}{5}} = 0.027$$

Important: The data provided here is for demonstration purpose only. You cannot use those. You will blank data table provided below.

Data Table

Trials	Data x_i	Mean \bar{x}	Data - mean $x_i - \bar{x}$	$(x_i - \bar{x})^2$
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
	$\sum x_i =$			$\sum (x_i - \bar{x})^2 =$

Standard Deviation $s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{N}} =$ _____

Assignment 1: Draw Frequency Histogram. **No Need**

Assignment 2: Calculate how many data lie in the range between $\bar{x} \pm s$. **No Need**

Assignment 3: Calculate what percentage of data lie in the range between $\bar{x} \pm s$. **No Need**

Assignment 4: Write conclusion (**Needed**)