ASSIGNMENT : 4

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PH17B011

1. Sample mean obtained : 15.7083
Sample standard deviation : 4.39534
(using $n-1$ degrees of freedom)

2. $$\text{mean} = \frac{102 + 100 + 105 + a + b}{5}$$

$$= 104$$

$$\Rightarrow \quad 520 = 307 + a + b$$

$$\Rightarrow \quad a + b = 213$$

$$\text{variance} = \sum_{i=1}^{n} \frac{(x_i - \text{mean})^2}{n-1} \; ; \; n = 5.$$

$$= 4$$

$$\Rightarrow \quad 16 = \{(100-104)^2 + (105-104)^2 + (102-104)^2 + (a-104)^2 + (b-104)^2\} / 4$$

$$64 = 16 + 4 + 1 + (a-104)^2 + (213-104-a)^2$$

$$\Rightarrow \quad 43 = a^2 - 208 + 104^2 + 109^2 - 218a + a^2$$

$$\Rightarrow \quad a^2 - 213a + 11327$$

$$\therefore \quad a, b = \frac{213 \pm \sqrt{213^2 - 4 \times 11327}}{2}$$

$$\therefore \quad a, b = 110.405, 102.595.$$

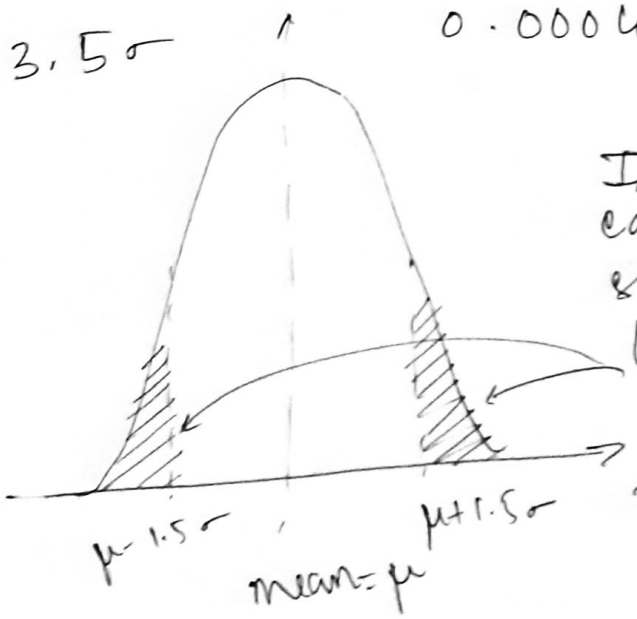
3 Frequency Table.

element	Frequency	Relative frequency
144	2	0.153846
137	3	0.230769
139	2	0.153846
141	4	0.307692
143	2.	0.153846

Relative frequency of line graph (with samples sorted in increasing order) is included in the folder.

5. For Gaussian distribution; taking mean = 0 and $\sigma = 1$.

~~Interval~~ Bound.	Probability that values lie beyond
1.5σ	0.133615
2.5σ	0.01242
3.5σ	0.000465989



In the above calculations, the shaded area has been calculated

For Breit-Wigner (Cauchy) distribution:

1.5σ	0.331945
2.5σ	0.1909
3.5σ	0.121424