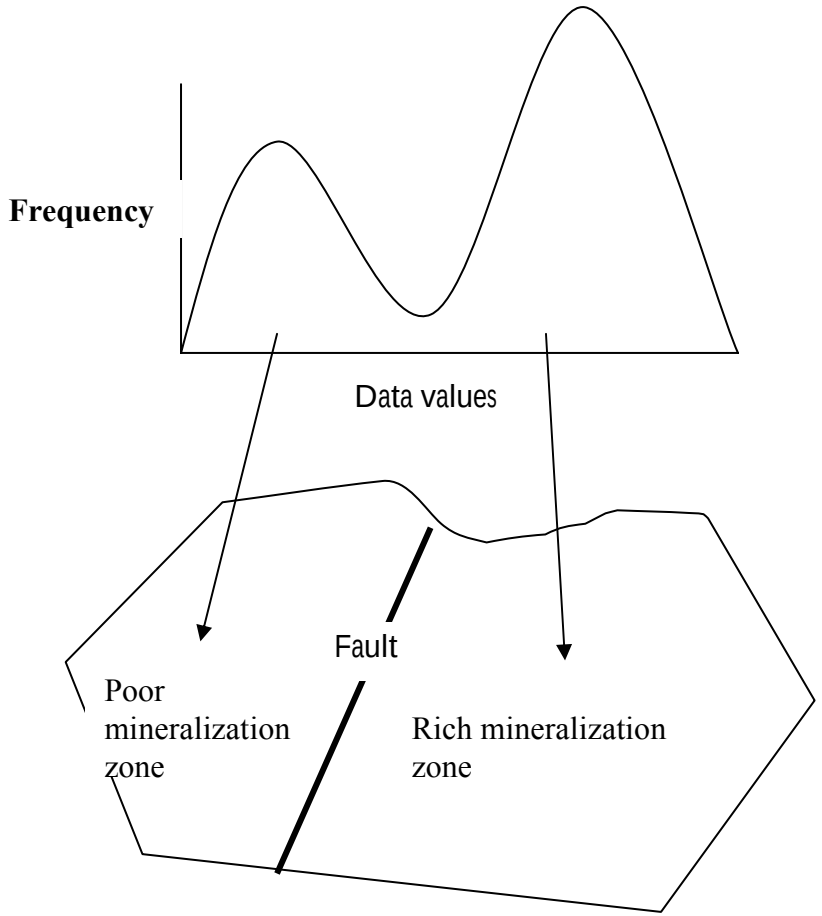
Why Statistics?

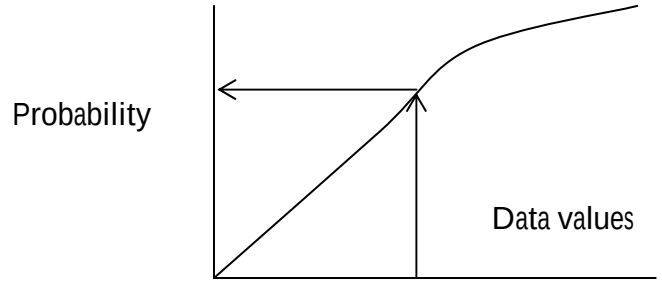
1) Quantify geological information



Why Statistics?

2) Conduct feasibility studies ➔ probability of existence of a mineral grade, or porosity in a geologic unit

3) Perform uncertainty analysis & risk assessment ➔ environmental site investigation.



4) Prepare a data set for further studies like the application of geostatistical methods, numerical models, … etc.

Univariate Statistics

- Univariate statistics deals with the organization, presentation, and summary of data of **ONE** variable.

- Statistical modeling is an approach for **fitting mathematical equations** to data in order to predict unknown quantities from measurements.

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- Postulate a model that describes the data & fit its parameters
- Validate (test) the model
- Predict the unknown

Experimental Frequency Distributions

1- Construction Mechanism

- Construct a frequency table
  - Divide the data into number of classes
  - List number of observations in each class (i.e. frequency of observations)
  - Relative frequency = Frequency of each class / Total number of observations
  - % Frequency = Relative frequency X 100
  - Cumulative frequency = Adding frequencies as moving down the frequency table
  - % Cumulative frequency = Adding % frequencies as moving down the frequency table.

Experimental Frequency Distributions

2- Graphing Mechanism

- Graphical representation of data
  - Histogram or bar graph
  - Frequency curve
  - Relative frequency curve
  - Cumulative frequency bar graph
  - Cumulative frequency curve
  - % Cumulative frequency curves

- The proportion (probability of occurrence) of sample values or values that are smaller than a given value can be directly read from the above mentioned curves.

Experimental Frequency Distributions

3- Example

- Consider the following data set of mineralization percentages:

8.1	24.9	32.2	36.9	41.3	47.6	54.5	74
12.8	26.8	33.4	37.3	41.5	48.5	54.6	77.3
14.3	27.1	33.6	37.4	41.7	49.4	56.1	
14.9	27.4	33.9	37.9	42.4	49.7	58.2	
15.7	28.2	34.1	38.5	42.9	50.1	59.3	
19.3	29.5	34.7	38.9	43.5	50.9	59.5	
20.3	29.2	35.1	39.1	43.6	51.5	59.8	
21.7	30.1	35.2	40.2	45.6	51.8	63.8	
22.6	31.8	35.6	40.8	46.1	52.7	64.1	
24.8	31.9	36.5	40.9	46.8	53.7	64.8	

Experimental Frequency Distributions

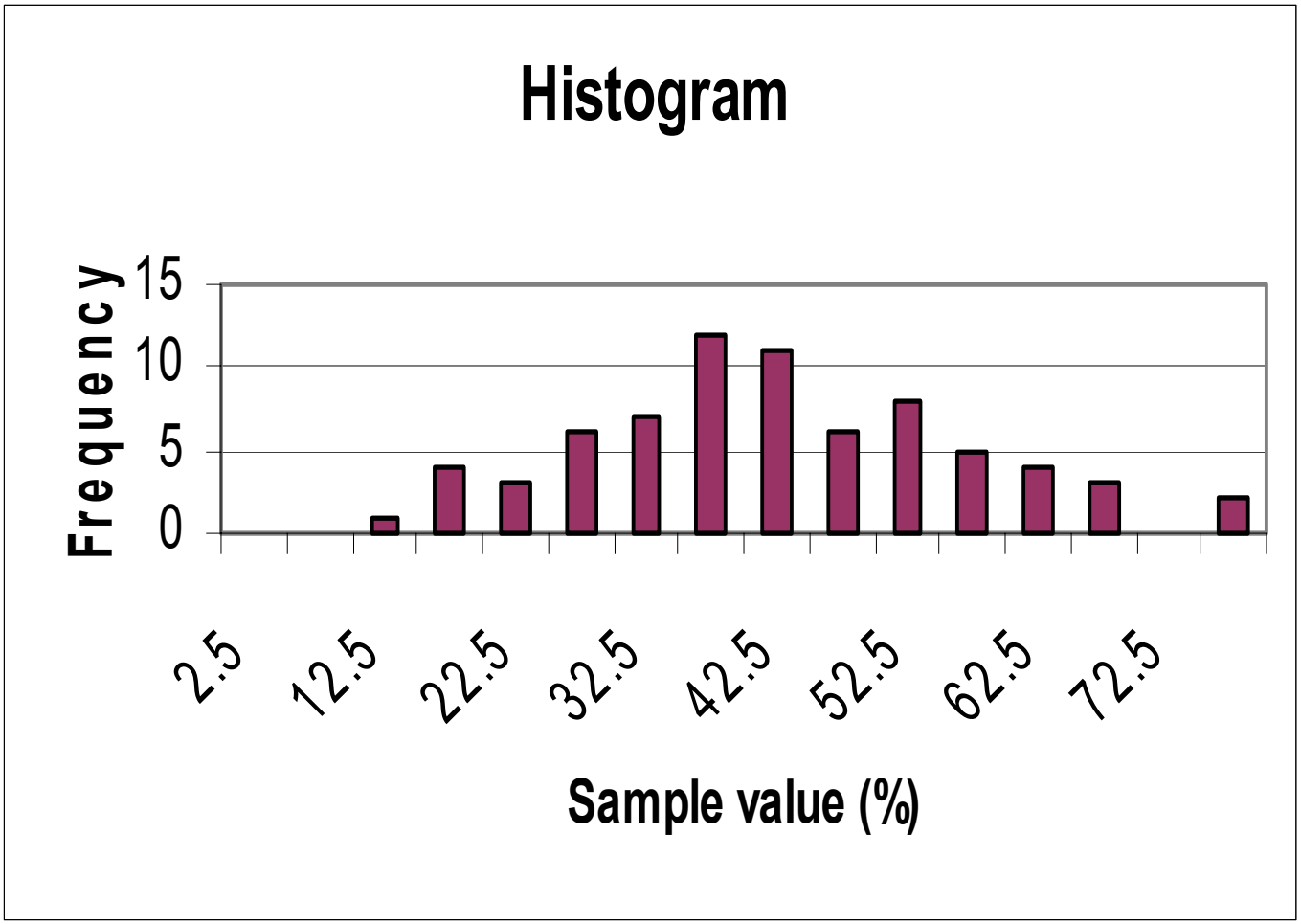
3- Example

Frequency Distribution Table

Bin(Class mid-point)	*Frequency*	*Relative Frequency*	*% Frequency*	*CF*	*%CF*
2.5	0	0	0	0	.00%
7.5	0	0	0	0	.00%
12.5	1	0.013888889	1.388888889	1	1.39%
17.5	4	0.055555556	5.555555556	5	6.94%
22.5	3	0.041666667	4.166666667	8	11.11%
27.5	6	0.083333333	8.333333333	14	19.44%
32.5	7	0.097222222	9.722222222	21	29.17%
37.5	12	0.166666667	16.66666667	33	45.83%
42.5	11	0.152777778	15.27777778	44	61.11%
47.5	6	0.083333333	8.333333333	50	69.44%
52.5	8	0.111111111	11.11111111	58	80.56%
57.5	5	0.069444444	6.944444444	63	87.50%
62.5	4	0.055555556	5.555555556	67	93.06%
67.5	3	0.041666667	4.166666667	70	97.22%
72.5	0	0	0	70	97.22%
77.5	2	0.027777778	2.777777778	72	100.00%
Sum	72	1	100		

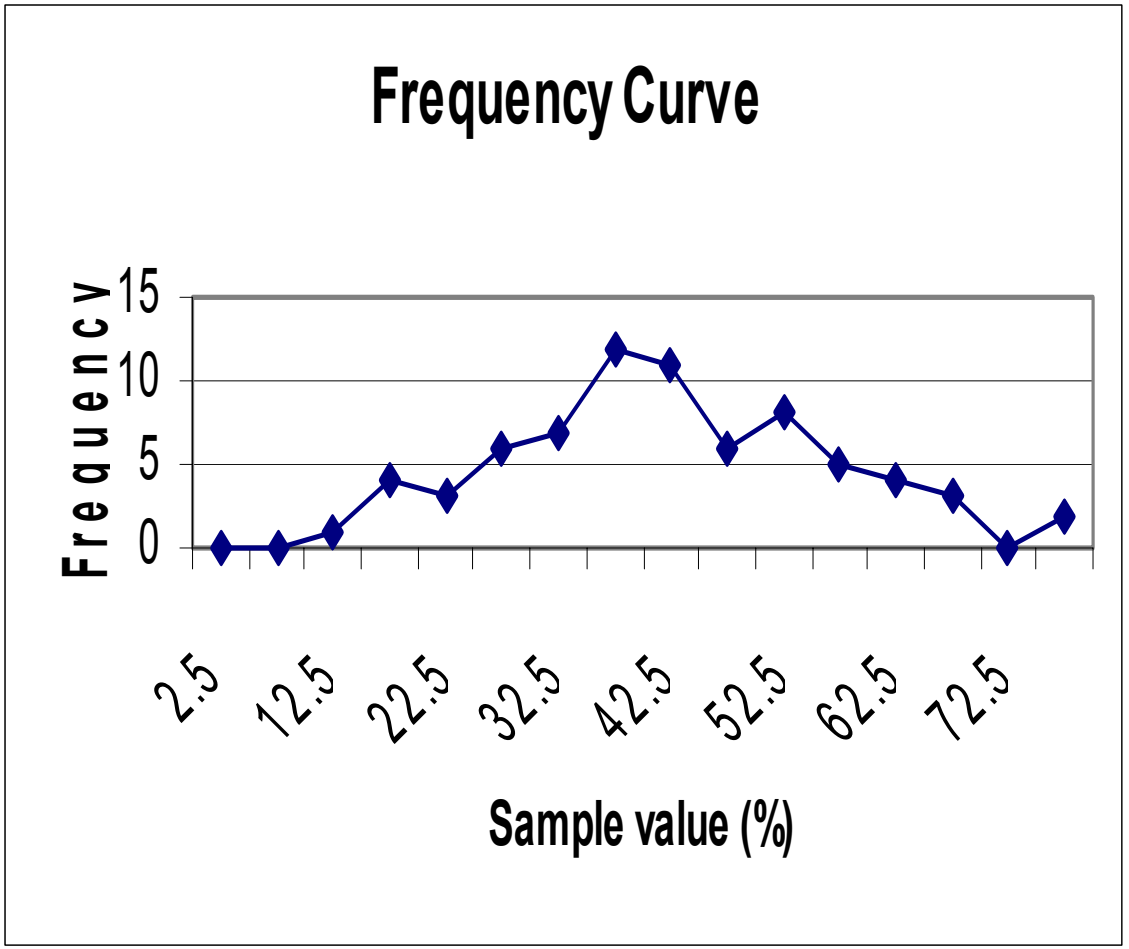
Experimental Frequency Distributions

3- Example



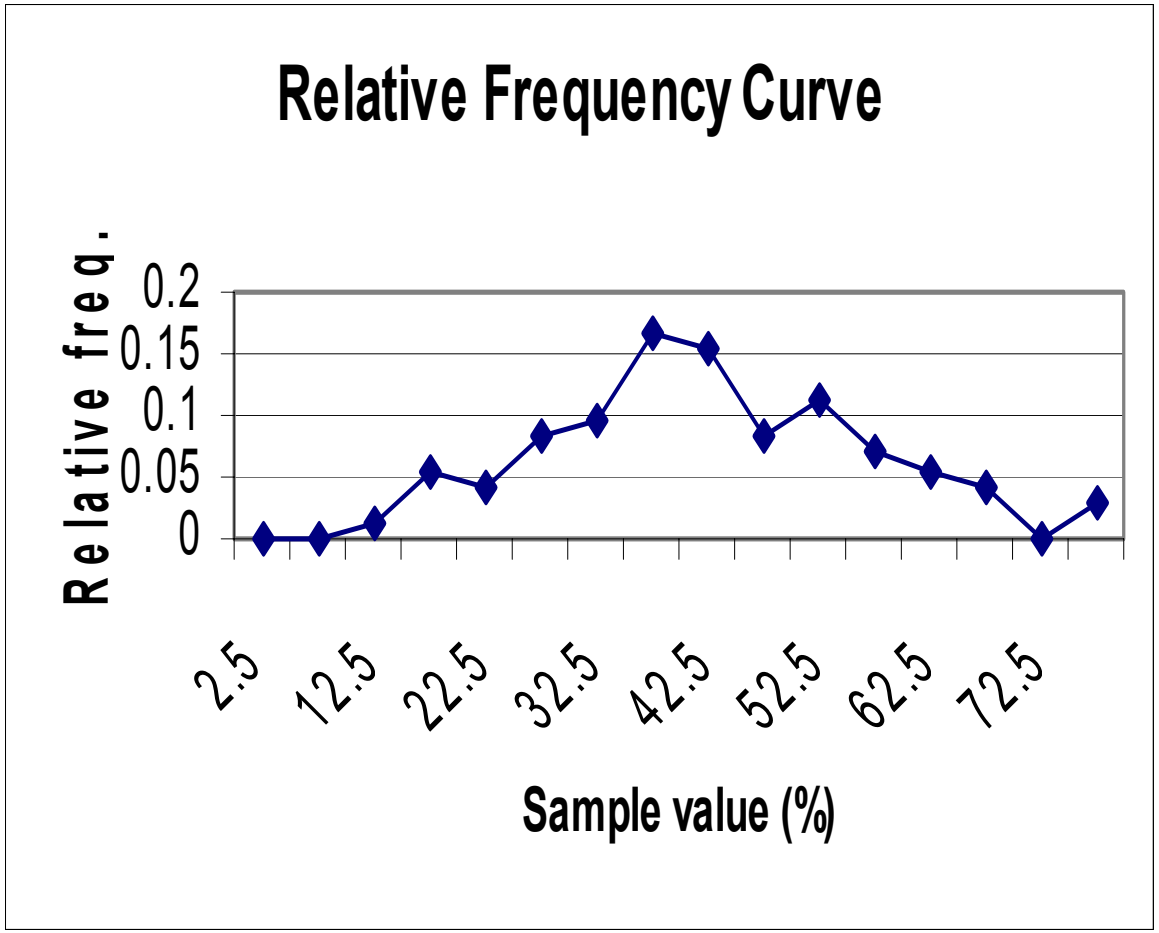
Experimental Frequency Distributions

3- Example



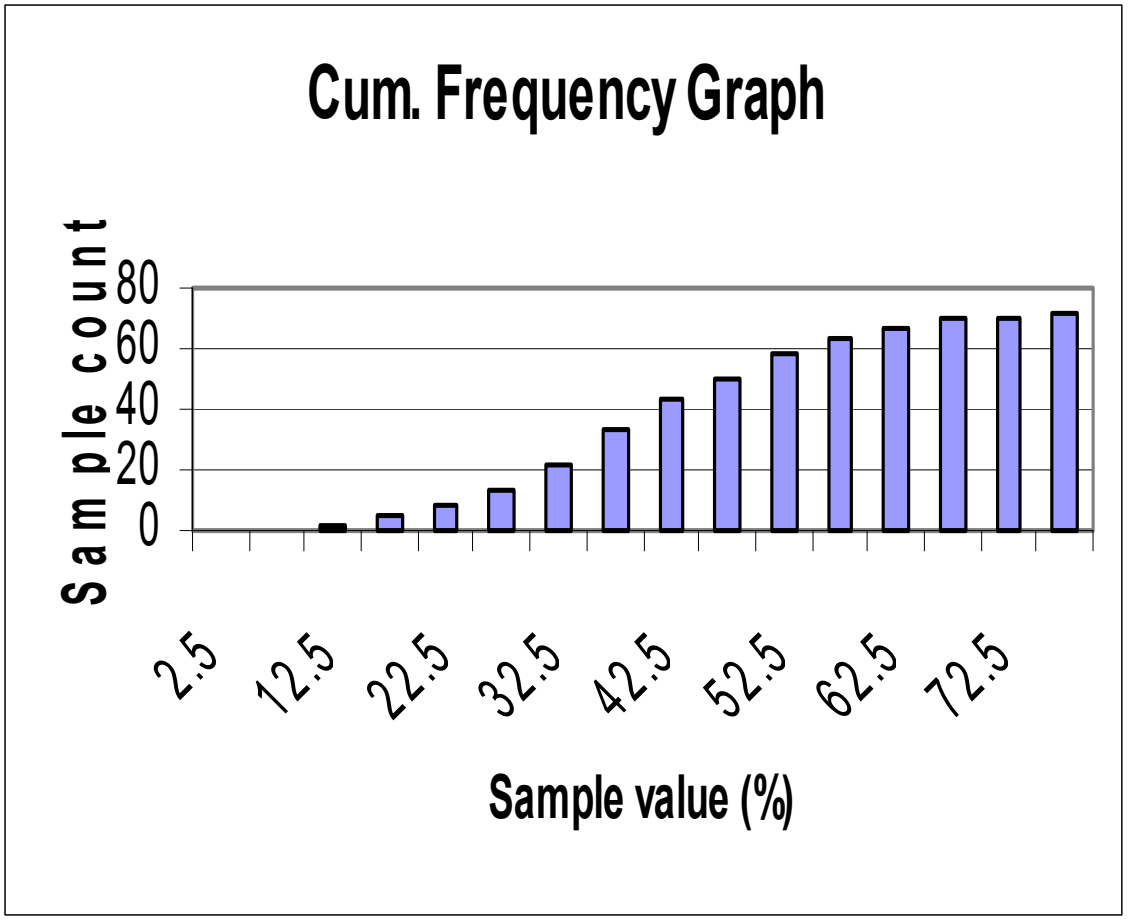
Experimental Frequency Distributions

3- Example



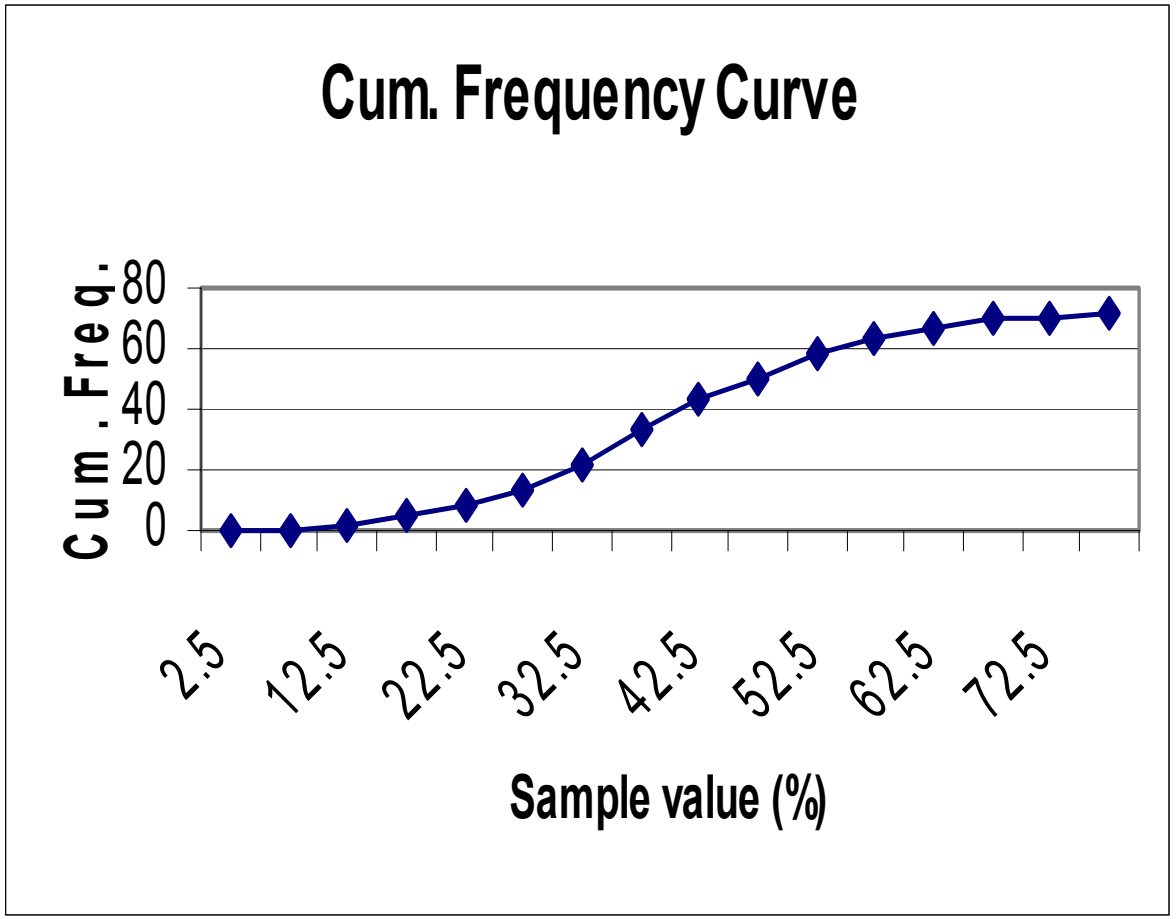
Experimental Frequency Distributions

3- Example



Experimental Frequency Distributions

3- Example



Experimental Frequency Distributions

3- Example