

# Frequency Distribution

A **frequency distribution** is a grouping of quantitative data into mutually exclusive classes showing the number of observations in each **class**.

The goal is to construct tables, charts, graphs that can quickly reveal the concentration, extreme values and shape of data.

We construct a frequency distribution by using the following steps:

1. Decide on the number of classes
2. Determine the class interval or width
3. Set the individual class limits or class boundaries
4. Tally the observations into the classes
5. Count the number of items in each class

90, 66, 80, 70, 94, 71, 85, 73, 89, 77,  
75, 76, 88, 79, 61, 77, 68, 81, 77, 93

# Setup the Number of Classes

**Step 1:** Decide on the number of classes.

A useful recipe to determine the number of classes ( $j$ ) is the “2 to the  $j$  rule”. This rule suggests you select the smallest number ( $j$ ) for the number of classes such that  $2^j$  is greater than the number of observations ( $n$ ).

Since there are 20 values,  $n = 20$ .

If we let  $j = 5$ , then  $2^5 = 32$ . Since 32 is more than 20, we can use 5 classes for this problem.

61, 66, 68, 70, 71, 73, 75, 76, 77, 77, 77, 79, 80, 81, 85, 88, 89, 90, 93, 94

# Setup the Class Intervals

**Step 2:** Determine the class interval or width.

Generally the class interval or class width is the same for all classes.

The classes all taken together must cover at least the distance from the minimum value in the raw data up to the maximum value.

$$i > \frac{\text{Maximum Value} - \text{Minimum Value}}{j}$$

where  $i$  is the class interval and  $j$  is the number of classes.

$$i > \frac{94 - 61}{5} = 6.6$$

We then round up to some convenient number like a multiple of 10 or 100.  
For our example, we can round to 7.

61, 66, 68, 70, 71, 73, 75, 76, 77, 77, 77, 79, 80, 81, 85, 88, 89, 90, 93, 94

# Setup Class Limits, Tally the Data

**Step 3:** Set the individual class limits.

State clear class limits so you can put each observation into only one category...that is, avoid overlapping class limits.

For our example, we can use the following class limits

**Step 4:** Tally the numbers into the classes

**Step 5:** Count the number of items in each class

60	to under	67
67	to under	74
74	to under	81
81	to under	88
88	to under	95

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Classes			Frequency
60	to under	67	2
67	to under	74	4
74	to under	81	7
81	to under	88	2
88	to under	95	5

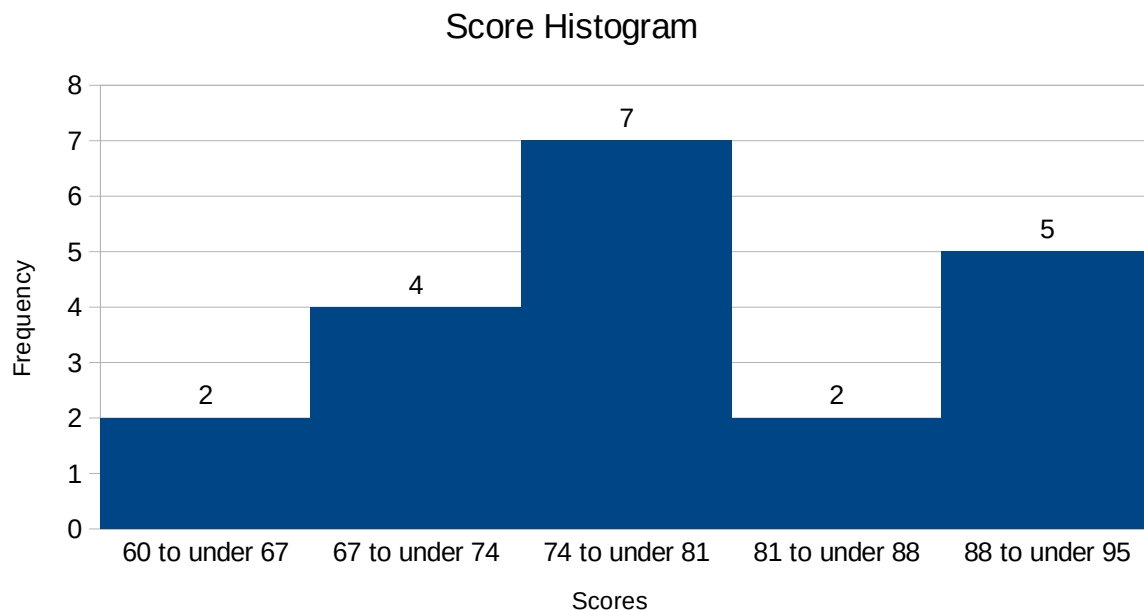
61, 66, 68, 70, 71, 73, 75, 76, 77, 77, 77, 79, 80, 81, 85, 88, 89, 90, 93, 94

# Histogram

Frequency distribution table is one way to represent the distribution of scores

Frequency distribution can also be represented graphically by the use of a histogram plot where the frequency is plotted on the y-axis and classes on the x-axis

Plotting of qualitative (categorical) data, results in bar charts in which there is a spacing between the frequency bars



90, 66,  
80, 70,  
94, 71,  
85, 73,  
89, 77,  
75, 76,  
88, 79,  
61, 77,  
68, 81,  
77, 93