جامعة اشور
كلية الهندسة
قسم الهندسة المدنية

(ENGINEERING STATISTICS)

الاحصاء الهندسي

المرحلة الأولى

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المحاضرة السادسة

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(Graphical Display for Data)

After you have organized the data into a frequency distribution, you can present them in graphical form. The purpose of graphs in statistics is to convey the data to the viewers in pictorial form.

Statistical graphs can be used to describe the data set or to analyze it. Graphs are also useful in getting the audience's attention in a publication or a speaking presentation.

The three most commonly used graphs in research are

1. The histogram.

2. The frequency polygon.

3. The cumulative frequency graph, or ogive (pronounced o-give).

The Histogram:

is a graph that displays the data by using contiguous vertical bars (unless the frequency of a class is 0) of various heights to represent the frequencies of the classes.

(عرض بياني للبيانات)

بعد تنظيم البيانات في توزيع تكراري، يمكنك عرضها بيانيًا. الغرض من الرسوم البيانية في الإحصاء هو إيصال البيانات للمشاهدين بشكل تصويري.

يمكن استخدام الرسوم البيانية الإحصائية لوصف مجموعة البيانات أو تحليلها. كما أنها مفيدة في جذب انتباه الجمهور في المنشورات أو العروض التقديمية.

الرسوم البيانية الثلاثة الأكثر استخدامًا في البحث هي:

1. الهيستوغرام.
2. مضلع التكرار.
3. الرسم البياني التكراري التراكمي، أو أوجيف (يُنطق أو-جيف).

الهيستوغرام:

هو رسم بياني يعرض البيانات باستخدام أشرطة عمودية متجاورة (ما لم يكن تكرار الفئة صفرًا) بارتفاعات مختلفة لتمثيل ترددات الفئات.

Example 25: Construct a histogram to represent the data of example 24.

Frequency (f)	Real interval limit
2	99.5-104.5
8	104.5-109.5
18	109.5-114.5
13	114.5-119.5
7	119.5-124.5
1	124.5-129.5
1	129.5-134.5

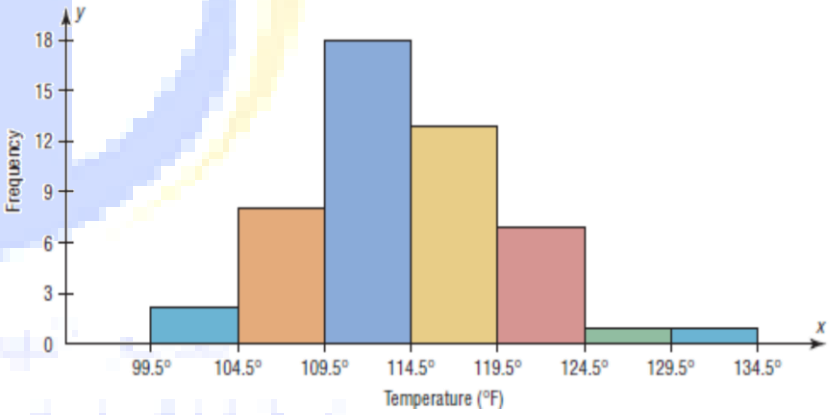
Total (N)=50

Solution:

Step 1: Draw and label the *x* and *y* axes. The *x* axis is always the horizontal axis, and the *y* axis is always the vertical axis.

Step 2 Represent the frequency on the *y* axis and the class boundaries on the *x* axis.

Step 3 Using the frequencies as the heights, draw vertical bars for each class.



The Frequency Polygon:

is a graph that displays the data by using lines that connect points plotted for the frequencies at the midpoints of the classes. The frequencies are represented by the heights of the points.

مضلع التردد: هو رسم بياني يعرض البيانات باستخدام خطوط تربط النقاط المرسومة للترددات عند نقاط منتصف الفئات. تُمثَّل الترددات بارتفاعات النقاط.

Example 26: Using the frequency distribution given in Example 24, construct a frequency polygon.

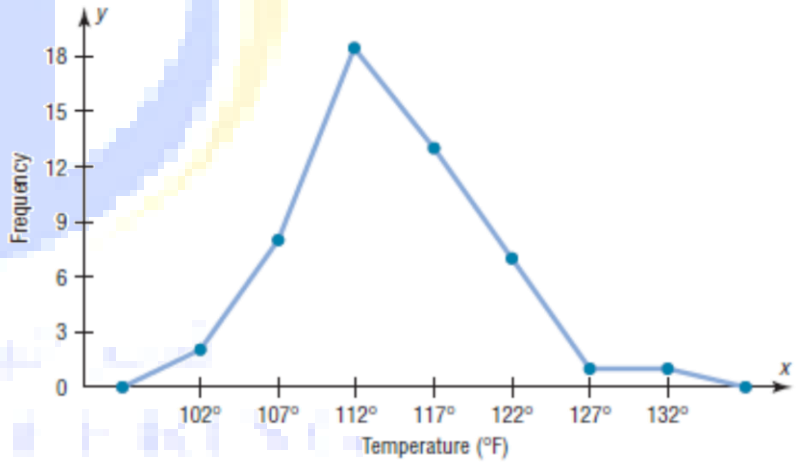
Solution:

Step 1: Find the interval center of each class by adding the upper and lower boundaries and dividing by 2.

Step 2: Draw the x and y axes. Label the x axis with the midpoint of each class, and then use a suitable scale on the y axis for the frequencies.

Step 3: Using the midpoints for the x values and the frequencies as the y values, plot the points.

Step 4 Connect adjacent points with line segments. Draw a line back to the x axis at the beginning and end of the graph, at the same distance that the previous and next midpoints would be located.



The cumulative frequency graph (The Ogive): is a graph that represents the cumulative frequencies for the classes in a frequency distribution.

الرسم البياني التكراري التراكمي (أوجيف): هو رسم بياني يمثل التكرارات التراكمية للفئات في توزيع التكرار.

Example 27: Construct an ogive for the frequency distribution described in Example 24.

Frequency (f)	Cumulative frequency (f_c)
2	2
8	10
18	28
13	41
7	48
1	49
1	50

Total (N)= 50

Step 1: Find the cumulative frequency for each class.

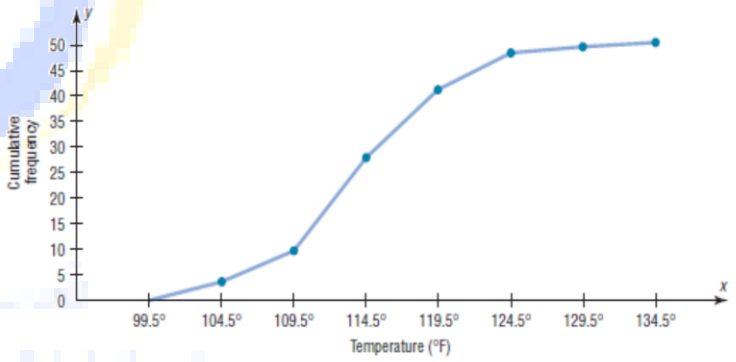
Step 2: Draw the *x* and *y* axes. Label the *x* axis with the class boundaries. Use an appropriate scale for the *y* axis to represent the cumulative frequencies.

(Depending on the numbers in the cumulative frequency columns, scales such as 0, 1, 2, 3, . . ., or 5, 10, 15, 20, . . ., or 1000, 2000, 3000, . . . can be used.

Do *not* label the *y* axis with the numbers in the cumulative frequency column.) In this example, a scale of 0, 5, 10, 15, . . . will be used.

Step 3: Plot the cumulative frequency at each upper-class boundary. Upper boundaries are used since the cumulative frequencies represent the number of data values accumulated up to the upper boundary of each class.

Step 4: Starting with the first upper class boundary, 104.5, connect adjacent points with line segments. Then extend the graph to the first lower class boundary, 99.5, on the *x* axis.



Example 28: For the data shown, draw the histogram, frequency polygon and the cumulative frequency graph

Class limits	Frequency
50-59	1
60-69	2
70-79	4
80-89	3
90-99	3
100-109	1
110-119	2
120-129	2
130-139	3
140-149	6

Solution:

1- Find the interval center

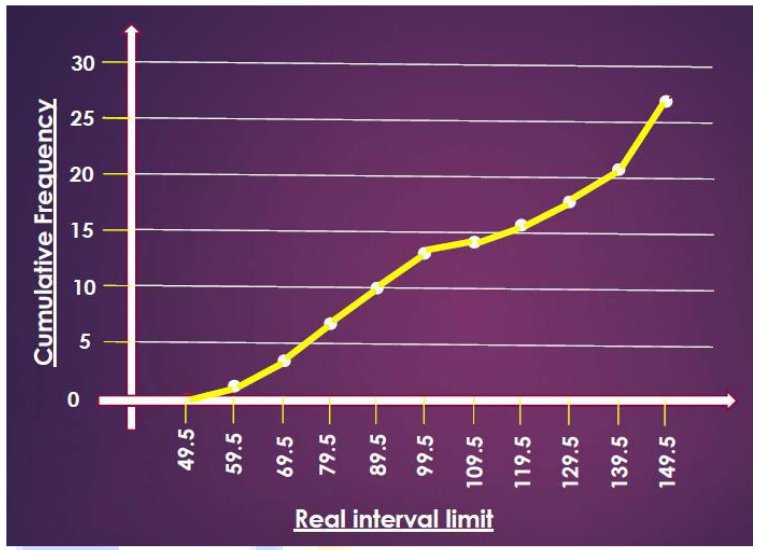
2- find the upper and lower real interval

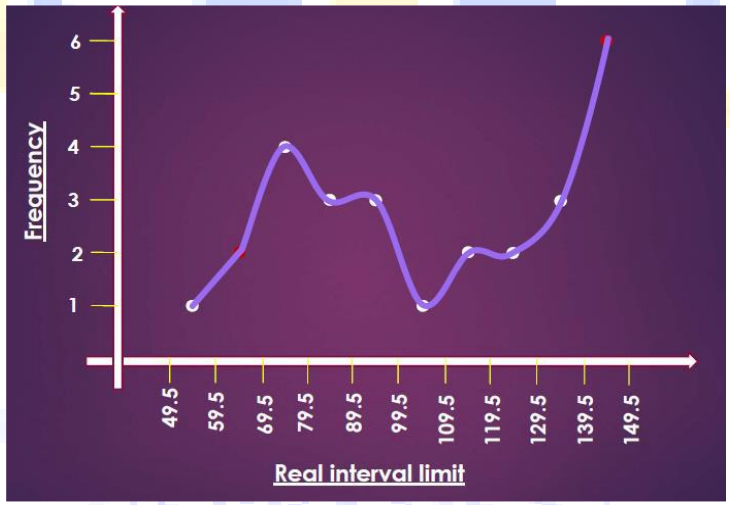
Real upper limit = interval center +0.5 * class width= interval center + 0.5 * 10

Real lower limit = interval center -0.5 * class width= interval center - 0.5 * 10

Class Limits	Frequency	Interval Center	Real intervals	Cumulative frequency
50-59	1	54.5	49.5 – 59.5	1
60-69	2	64.5	59.5 – 69.5	3
70-79	4	74.5	69.5 – 79.5	7
80-89	3	84.5	79.5 – 89.5	10
90-99	3	94.5	89.5 – 99.5	13
100-109	1	104.5	99.5 – 109.5	14
110-119	2	114.5	109.5 – 119.5	16
120-129	2	124.5	119.5 – 129.5	18
130-139	3	134.5	129.5 – 139.5	21
140-149	6	144.5	139.5 – 149.5	27


Frequency
1
2
3
4
5
6
49.5
59.5
69.5
79.5
89.5
99.5
109.5
119.5
129.5
139.5
149.5
Real interval limit


Cumulative Frequency
0
5
10
15
20
25
30
49.5
59.5
69.5
79.5
89.5
99.5
109.5
119.5
129.5
139.5
149.5
Real interval limit


Frequency
1
2
3
4
5
6
49.5
59.5
69.5
79.5
89.5
99.5
109.5
119.5
129.5
139.5
149.5
Real interval limit