Ch.6 More about Statistical Diagrams and Graphs

Discrete data:数据有固定间隔，比如数量的间隔就是1；

Continuous data:数据无固定间隔，比如量度长度，间隔并无固定，似乎量度工具的精确度。

6.1 Organization of Continuous Data

- Class limits

  - lower class limit：范围内最低
  - upper class limit：范围内最高

- Class Mark

$$\frac{lower\,class\,limit + upper\,class\,limit}{2} \tag{1}$$

- Class boundaries

- halfway points that separate any two consecutive class interval
  分隔任意两个连续类间隔的中点（正式定义）
- lower class boundary = 最后加个5，前面一个数-1
- upper class boundary= 最后加个5
- Class width (any two class intervals)

$$upper\ class\ boundary - lower\ class\ boundary \qquad (2)$$

6.2 Histograms, Frequency polygons and Frequency Curves

A. Histograms

present continuous data

width of each bar = class width of that class interval

height ~~of each bar~~ = frequency ~~of that class interval~~

Long questions

1. Q. Find the range of …

    A: The range is

    '$< upper\ class\ boundary > - < lower\ class\ boundary >$'

2. Q. Find the greatest possible difference …

    A: Greatest possible difference =
    $< 图表中最大的\ class\ boundary > - < 图表中最小的\ class\ boundary >$

C. Frequency Curves

Long questions

1. Q. In which … perform better? Explain.

    A. The frequency curve for … lies to the right of the curve for … This means that … get higher … in … than … in general. Thus, … perform better in …

6.3 Cumulative Frequency Polygons and Cumulative Frequency Curves

A. Cumulative Frequency Tables

> *refers to the total no. of data which are less than a certain class boundaries*
>
> *continuous data can be organized in cumulative frequency table*

B. Cumulative Frequency Polygons

Rules:

1. The trend on the graph never goes down. (The cumulative frequency **never decreases**)
2. The cumulative frequency must start from 0
3. The last point on the cumulative frequency polygon refers to the **total** of data
4. For the point (x, y) on the graph, there are y data having values **less than** x.

D. Percentiles, Quartiles and Median

- 25% / $\frac{1}{4}$ = 25$^{\text{th}}$ percentile / lower quartile
- 50% / $\frac{1}{2}$ = 50$^{\text{th}}$ percentile / median
- 75% / $\frac{3}{4}$ = 75$^{\text{th}}$ percentile / upper quartile

Long questions

1. Q. What are the lower quartile and upper quartile?

   A.

   From the graph, the total frequency is AA (3)
   The cumulative frequency corresponding to the lower quartile is $= AA \times 25$
   From the graph, the lower quartile $= XX$ （根据上面得出的答案，找出对应数据）
   The cumulative frequency corresponding $= BB \times 75$ From the graph, the upper quartile $= XX$（根据上面得出的答案，找出对应数据）

6.4 Abuses of Statistics

Rules:

1. The use of the axes, such as the scale and the starting value

2. The ratio of the sizes of the figures shown in the graph

3. The quantities shown either corresponding to

      a. the total no. of data
      b. the cumulative frequency
      c. the percentage of the total no. of data

Long questions

1. Q. Find the ratio of the height of the last two bars.

> *Height of bar A =3 cm*
>
> *Height of bar B =7 cm*

A. The required ratio $= 3{:}7$

2. Q. How does the graph mislead people?\

> *Area of bar A =3 cm*
>
> *Area of bar B =7 cm*
>
> *No. of bar A=150*
>
> *No. of bat B=100*

A.

The ratio of the area of the figure $= 3{:}7$ (4)
    Ratio of the no. of …
      $= 150 : 100$
      $= 3 : 2$
$\therefore$ The different in the width of the figures exaggerates the ratio of the actual no. of readers.

3. Q. Suggest a way to reduce the misunderstanding caused by the graph.

A. Redraw the diagrams with same … (e.g. width)

4. (Pie charts) Q. Comment on the following statement.

> *The amount … is the same as ..*

Ch.7 Linear Equations in Two Unknowns

7.1 Linear Equations in Two Unknowns and Their Graphs

1. Determine whether the following pairs are solutions of the equation (eg. $2x + y = 4$)

e.g. (4,0)

Solution:

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1  Sub. (4,0) into the equation
2  L.H.S. = 2(4)+0
3         = 8
4         ≠ R.H.S.
5  ∵ L.H.S.  ≠ R.H.S.
6  ∴ (4,0) is not a solution of the equation.
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