IES MURILLO

Maths 3rd ESO

# EXAM UNIT 12 (STATISTICS)

1. Find two examples of each: (2 points)

a) non ordered qualitative characters

b) ordered qualitative characters

c) discrete quantitative character

d) continuous quantitative character

2. Following are the data represent the lives of a model of refrigerators: (5 p)

| Life (years) | [0,4) | [4,8) | [8,12) | [12,16) | [16,20) |
|---|---|---|---|---|---|
| Refrigerators | 2 | 7 | 16 | 13 | 2 |

a) Prepare a frequency table.

b) Find the modal and median classes.

c) Find the mean and the range.

d) Find the variance and standard deviation.

e) Build a histogram and the frequency polygon to represent the data.

f) What is the percentage of refrigerators that last less than 8 years?

3. Solve the following equations: (2 p)

a) $(x+4)^2-(2x-1)^2=24x$ b) $\frac{3x+2}{5}-\frac{4x-1}{10}+\frac{5x-2}{8}=\frac{x+1}{4}$

4. Solve the following system by two different methods: graphing and addition or substitution.

$$\left.\begin{array}{l} x+y=0 \\ \frac{x+3}{4}+2y=-1 \end{array}\right\}$$

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## SOLUTION

1. Find two examples of each:

   a) non ordered qualitative characters: Place of birth, professions.

   b) ordered qualitative characters: Months of birth,

   c) discrete quantitative character: Number of brothers and sisters, number of rooms in a group of houses.

   d) continuous quantitative character: weight and age of people from Seville .

2. Following are the data represent the lives of a model of refrigerators:

| Life (years) | | | | | |
|---|---|---|---|---|---|
| Refrigerators | | | | | |

   a) Prepare a frequency table.

| Interval | $x_i$ | $f_i$ | $F_i$ | $x_i \cdot f_i$ | $x_i^2 \cdot f_i$ |
|---|---|---|---|---|---|
| [0,4) | 2 | 2 | 2 | 4 | 8 |
| [4,8) | 6 | 7 | 9 | 42 | 252 |
| [8,12) | 10 | 16 | 25 | 160 | 1600 |
| [12,16) | 14 | 13 | 38 | 182 | 2548 |
| [16,20) | 18 | 2 | 40 | 36 | 648 |
| | | N=40 | | 424 | 5056 |

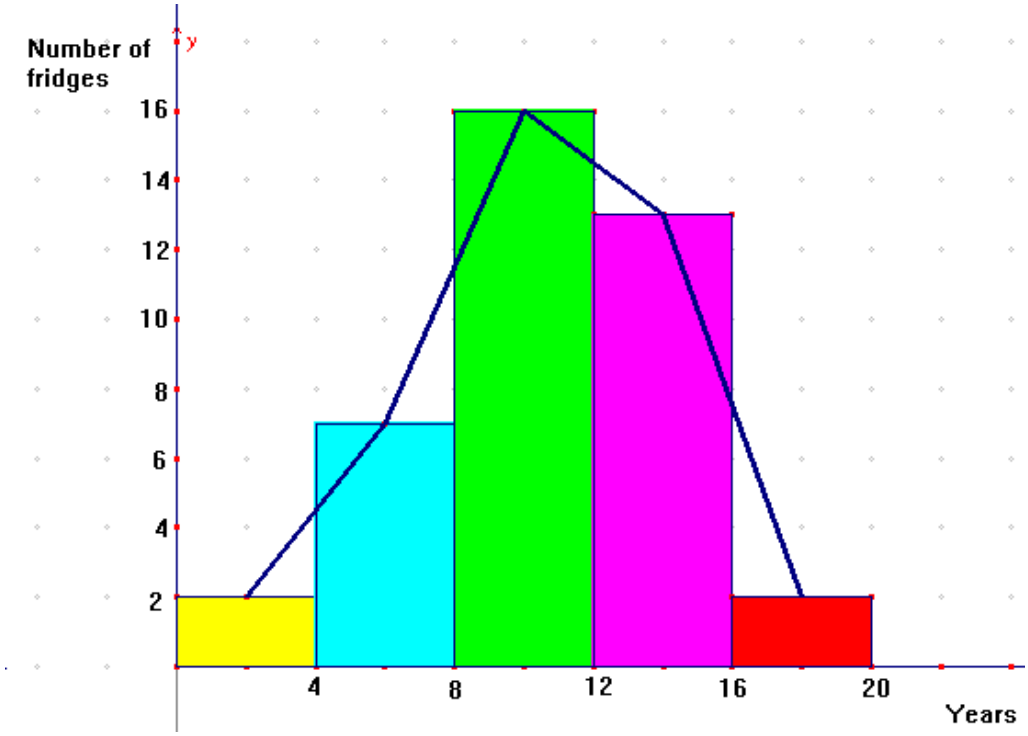
   b) Find the modal and median classes. $M_o = [8,12)$; $M_e = [8,12)$

   c) Find the mean and the range. $r = 20 - 0 = 20$; $\overline{x} = \frac{424}{40} = 10.6$ years

   d) Find the variance and standard deviation.

$$\sigma^2 = \frac{\sum x_i^2 f_i}{N} - \overline{x}^2 = \frac{5056}{40} - 10.6^2 = 14.04 \rightarrow \sigma = 3.75 \text{ years}$$

e) Build a histogram and the frequency polygon to represent the data.




f) What is the percentage of refrigerators that last less than 8 years?

Less than 8 years: 2 + 7 = 9

$$\frac{x}{100}=\frac{7}{40}\rightarrow x=\frac{700}{40}=17.5\,\%$$ of the fridges last less than 8 years

3. Solve the following equations:

a) $(x+4)^2-(2x-1)^2=24x\rightarrow x^2+8x+16-4x^2+4x-1=24x$

$$-3x^2-12x+15=0\rightarrow x=\frac{12\pm\sqrt{144+180}}{-6}=\frac{12\pm18}{-6}=\begin{cases}-5\\1\end{cases}$$

b) $$\frac{3x+2}{5}-\frac{4x-1}{10}+\frac{5x-2}{8}=\frac{x+1}{4}\rightarrow\frac{24x+16}{40}-\frac{16x-4}{40}+\frac{25x-10}{40}=\frac{10x+10}{40}$$

$$24x+16-16x+4+25x-10=10x+10\rightarrow 23x=0\rightarrow x=0$$

4. Solve the following system by two different methods: graphing and addition or substitution.

$$\left.\begin{array}{l} x+y=0 \\ \dfrac{x+3}{4}+2y=-1 \end{array}\right\} \rightarrow \left.\begin{array}{l} y=-x \\ x+3+8y=-4 \end{array}\right\} \rightarrow \left.\begin{array}{l} y=-x \\ y=\dfrac{-x-7}{8} \end{array}\right\}$$

Substitution:

$$\left.\begin{array}{l} y=-x \\ x+3+8y=-4 \end{array}\right\} \rightarrow x+3-8x=-4$$

$$-7x=-7 \Rightarrow x=1$$
$$y=-x \rightarrow y=-1$$

Solution:

$$x=1$$
$$y=-1$$