## Statistics (Q 7, Paper 2)

## Lesson No. 6: Cumulative Frequency

## 2007

7 (b) The table below shows the time, in minutes, that customers were waiting to be served in a restaurant.

| Time (minutes) | $<5$ | $<10$ | $<15$ | $<20$ | $<25$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Number of customers | 5 | 20 | 70 | 110 | 120 |

(i) Draw a cumulative frequency curve (ogive).
(ii) Use your curve to estimate the median waiting time.
(iii) Use your curve to estimate the interquartile range.

## 2006

7 (b) The number of new cars in various price ranges sold by a retailer in one month is recorded in the following table:

| Price (€1000’s) | $10-15$ | $15-20$ | $20-25$ | $25-30$ | $30-50$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Number sold | 5 | 15 | 25 | 15 | 20 |

[Note: 15-20 means at least 15 but less than 20, etc.]
(i) Draw a histogram to represent the data.
(ii) By taking the data at the mid-interval values, calculate the mean price per car.
(iii) Copy and complete the following cumulative frequency table:

| Price (€1000’s) | $<15$ | $<20$ | $<25$ | $<30$ | $<50$ |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Number sold |  |  |  |  |  |

(iv) Draw the cumulative frequency curve (ogive).
(v) Using your curve, estimate how many of the cars sold were priced between the mean and the median.

## 2005

7 (c) A concert began at 8.00 p.m. The cumulative frequency table below gives the number of people in the concert hall at the times stated.

| Time p.m. | 7.10 | 7.20 | 7.30 | 7.40 | 7.50 | 8.00 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Number of people | 0 | 30 | 100 | 160 | 275 | 300 |

(i) Copy and complete the following frequency table to show the number of people who entered the hall during each time interval.

| Time interval | $7.10-7.20$ | $7.20-7.30$ | $7.30-7.40$ | $7.40-7.50$ | $7.50-8.00$ |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Number of people |  |  |  |  |  |

(ii) In which interval does the median time of arrival lie?
(iii) In which time interval did the greatest number of people enter the concert hall?
(iv) What is the least number of people who could have been in the concert hall at 7.15 p.m?

## 2003

7 (a) The heights of 200 people are recorded to the nearest centimetre. The results are represented by the ogive below.

(i) Copy the cumulative frequency table below and use the ogive to complete it.

| Height | $<130$ | $<145$ | $<160$ | $<175$ | $<190$ | $<205$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Number of people | 0 |  |  |  |  |  |

(ii) Hence, copy and complete the following grouped frequency table:

| Height | $130-144$ | $145-159$ | $160-174$ | $175-189$ | $190-204$ |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Number of people |  |  |  |  |  |

(iii) Using your grouped frequency table, and taking mid-interval values, find an estimate of the mean height.
(iv) Use the ogive to estimate the number of people who are taller than the mean.

## 2002

7 (b) The following cumulative frequency table refers to the ages of 70 guests at a wedding:

| Age (in years) | $<20$ | $<40$ | $<60$ | $<90$ |
| :--- | :---: | :---: | :---: | :---: |
| Number of guests | 6 | 23 | 44 | 70 |

(i) Copy and complete the following frequency table:

| Age (in years) | $0-20$ | $20-40$ | $40-60$ | $60-90$ |
| :--- | :--- | :--- | :--- | :--- |
| Number of guests |  |  |  |  |

[Note: 20 - 40 means 20 years old or more but less than 40 etc.]
(ii) Using mid-interval values, calculate the mean age of the guests.
(iii) What is the greatest number of guests who could have been over 65 years of age?

## 2001

7 (b) The following table shows the distribution of the amounts spent by 40 customers in a shop:

| Amount Spent (IR£) | $0-8$ | $8-12$ | $12-16$ | $16-20$ | $20-32$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Number of Customers | 2 | 9 | 13 | 10 | 6 |

[Note: IR£8 - IR£12 means IR£8 or over but less than IR£12 etc.]
(i) Taking mid-interval values, estimate the mean amount spent by the customers.
(ii) Copy and complete the following cumulative frequency table:

| Amount Spent (IR£) | $<8$ | $<12$ | $<16$ | $<20$ | $<32$ |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Number of Customers |  |  |  |  |  |

(iii) Draw a cumulative frequency curve (ogive).
(iv) Use your curve to estimate the number of customers who spent IR£25 or more.

## 2000

7 (c) The table below refers to the number of emergency calls recorded at a fire station each week for 52 weeks.

| No. of emergency calls | $0-10$ | $11-20$ | $21-30$ | $31-40$ | $41-50$ | $51-60$ | $61-70$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Number of weeks | 6 | 8 | 11 | 12 | 7 | 5 | 3 |

(i) Copy and complete the following cumulative frequency table:

| No. of emergency calls | $\leq 10$ | $\leq 20$ | $\leq 30$ | $\leq 40$ | $\leq 50$ | $\leq 60$ | $\leq 70$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Number of weeks | 6 |  |  |  |  |  | 52 |

(ii) Draw the cumulative frequency curve.
(iii) Use your graph to estimate the interquartile range.
(iv) Use your graph to estimate the number of weeks during which more than 56 emergency calls were recorded.

## 1999

7 (b) The cumulative frequency table below shows the distribution of ages of 110 people living in an estate.

| Age in years | $\leq 5$ | $\leq 10$ | $\leq 20$ | $\leq 35$ | $\leq 50$ | $\leq 60$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Number of people | 5 | 15 | 40 | 90 | 105 | 110 |

(i) Draw the cumulative frequency curve, putting number of people on the vertical axis.
(ii) Use your curve to estimate the median age.
(iii) Use your curve to estimate the number of people who are more than 15 years of age.

## 1997

7 (c) A new shop opened at 0900 hours. During the first hour of trading, customers were counted as they entered the shop. The following cumulative frequency table shows the number of customers who has entered before the given times:

| Time | 0910 | 0920 | 0930 | 0940 | 0950 | 1000 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| No. of customers | 45 | 69 | 95 | 120 | 144 | 250 |

(i) Draw a cumulative frequency curve.
(ii) A photograph was taken of the 100th. customer as he or she entered the shop. Use your curve to estimate the time at which the photograph was taken.
(iii) Use your curve to estimate the number of customers who entered the shop during the 15 minutes immediately after the photograph was taken.

## 1996

7 (b) The cumulative frequency table below shows the number of minutes taken by 80 people to complete a crossword:

| Minutes | $\leq 10$ | $\leq 20$ | $\leq 30$ | $\leq 40$ | $\leq 50$ | $\leq 60$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Cumulative Frequency | 3 | 13 | 39 | 59 | 73 | 80 |

Draw a cumulative frequency curve.
Use your curve to estimate
(i) the median time to complete the crossword
(ii) the interquartile range.

## Answers

20077 (b) (ii) 14 mins (iii) 6 mins
20067 (b) (ii) €26,250
20057 (c) (i)

| Time interval | $7.10-7.20$ | $7.20-7.30$ | $7.30-7.40$ | $7.40-7.50$ | $7.50-8.00$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Number of people | 30 | 70 | 60 | 115 | 25 |

(ii) $7.30-7.40$
(iii) $7.40-7.50$
(iv) 0

20037 (a) (i)

| Height | $<130$ | $<145$ | $<160$ | $<175$ | $<190$ | $<205$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Number of people | 0 | 10 | 40 | 90 | 190 | 200 |

(ii)

| Height | $130-144$ | $145-159$ | $160-174$ | $175-189$ | $190-204$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Number of people | 10 | 30 | 50 | 100 | 10 |

(iii) 172.25
(iv) 120

20027 (b) (i)

| Age (in years) | $0-20$ | $20-40$ | $40-60$ | $60-90$ |
| :--- | :---: | :---: | :---: | :---: |
| Number of guests | 6 | 17 | 21 | 26 |

(ii) 51
(iii) 26

20017 (b) (i) $£ 15.40$
(ii)

| Amount Spent (IR£) | $<8$ | $<12$ | $<16$ | $<20$ | $<32$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Number of Customers | 2 | 11 | 24 | 34 | 40 |

20007 (c) (i)

| No. of emergency calls | $\leq 10$ | $\leq 20$ | $\leq 30$ | $\leq 40$ | $\leq 50$ | $\leq 60$ | $\leq 70$ |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Number of weeks | 6 | 14 | 25 | 37 | 44 | 49 | 52 |

(ii) 23
(iii) 5

19997 (b)
(ii) 24
(iii) 84

19977 (c)
(ii) 0932
(iii) 38

1996
7 (b)
(i) 31 minutes
(ii) 18 minutes

