

Chapter 3

Presenting Data

Recap and Outline

- Stem and leaf plots, Bar charts and Histograms.
- Sometimes it better to look at relative frequencies.
- Other kinds of data.
- MINITAB

Percentage Relative Frequency Histograms

Service time	Frequency	Relative Frequency (%)
$175 \leq \textit{time} < 180$	1	2
$180 \leq \textit{time} < 185$	3	6
$185 \leq \textit{time} < 190$	3	6
$190 \leq \textit{time} < 195$	6	12
$195 \leq \textit{time} < 200$	10	20
$200 \leq \textit{time} < 205$	12	24
$205 \leq \textit{time} < 210$	8	16
$210 \leq \textit{time} < 215$	3	6
$215 \leq \textit{time} < 220$	3	6
$220 \leq \textit{time} < 225$	1	2
Totals	50	100

Percentage Relative Frequency Histograms

- Allows comparison between different sized data sets.
- Percentages are perhaps more easily understood than frequencies.

Relative Frequency Polygons

Class Interval	Mid Point	% Relative Frequency
$0 \leq x < 10$	5	10
$10 \leq x < 20$	15	20
$20 \leq x < 30$	25	35
$30 \leq x < 40$	35	25
$40 \leq x < 50$	45	10

Another example:

Weekly Income (£)	West Road (%)	Jesmond Road (%)
$0 \leq \textit{income} < 100$	9.3	0.0
$100 \leq \textit{income} < 200$	26.2	0.0
$200 \leq \textit{income} < 300$	21.3	4.5
$300 \leq \textit{income} < 400$	17.3	16.0
$400 \leq \textit{income} < 500$	11.3	29.7
$500 \leq \textit{income} < 600$	6.0	22.9
$600 \leq \textit{income} < 700$	4.0	17.7
$700 \leq \textit{income} < 800$	3.3	4.6
$800 \leq \textit{income} < 900$	1.3	2.3
$900 \leq \textit{income} < 1000$	0.0	2.3

Cumulative Frequency Polygons (Ogive)

Class Interval	% Relative Frequency	Cumulative % Relative Freq
$0 \leq x < 10$	10	10
$10 \leq x < 20$	20	30
$20 \leq x < 30$	35	65
$30 \leq x < 40$	25	90
$40 \leq x < 50$	10	100

Pie Charts

$$angle = \frac{\text{Number in category}}{\text{Total number in sample}(n)} \times 360.$$

Paper	Frequency	Degrees
The Times	140	77.5
The Sun	200	110.8
The Sport	50	27.7
The Guardian	120	66.5
The Financial Times	20	11.1
The Mirror	80	44.3
The Daily Mail	10	5.5
The Independent	30	16.6
Totals	650	360.0

Time Series Plots

Quarter	Units Sold
Q1 2000	86.7
Q2 2000	94.9
Q3 2000	94.2
Q4 2000	106.5
Q1 2001	105.9
Q2 2001	102.4
Q3 2001	103.1
Q4 2001	115.2
Q1 2002	113.7
Q2 2002	108.0
Q3 2002	113.5
Q4 2002	132.9
Q1 2003	126.3
Q2 2003	119.4
Q3 2003	128.9
Q4 2003	142.3
Q1 2004	136.4
Q2 2004	124.6
Q3 2004	127.9

Scatter Plots

Total costs (£)	Monthly Output
10300	2400
12000	3900
12000	3100
13500	4500
12200	4100
14200	5400
10800	1100
18200	7800
16200	7200
19500	9500
17100	6400
19200	8300

If you were interested in the relationship between the cost of production and the number of units produced you could easily plot this by hand.

1. The “response” variable is placed on the y -axis. Here we are trying to understand how total costs relate to monthly output and so the response variable is “total costs” .
2. The variable that is used to try to explain the response variable (here, monthly output) is placed on the x -axis.
3. Plot the pairs of points on the graph.