MATU9D2: Practical Statistics

Solutions to Weekly Assignment 1

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1. (i) $n = 40$ $\sqrt{40} = 6$ or 7 rows   Minimum $= 10$ Maximum $= 44$

1	0 0 1 2 3 3 4 4
1	5 6 7 7 8 9
2	0 1 2 3
2	5 5 8
3	0 0 1 2 4
3	5 5 5 6 8 9
4	0 0 0 1 2 3 4 4

Stem Unit $= 10$
Leaf Unit $= 1$
(Increment $= 5$)

(ii) Minimum $= 10$ Maximum $= 44$

Median $= \dfrac{(n+1)}{2}$ th smallest $= \dfrac{41}{2} = 20.5$th smallest

$= $ half way between 25 & 28

$= \dfrac{25+28}{2} = 26.5\,/\!/$

$Q_1 = \dfrac{(n+1)}{4}$ th smallest $= \dfrac{41}{4} = 10.25$th smallest

$= \frac{1}{4}$ way between 16 & 17

$= 16 + 0.25(17-16) = 16 + 0.25 \times 1$

$= 16.25\,/\!/$

$Q_3 = \dfrac{3(n+1)}{4}$ th smallest $= \dfrac{3\times 41}{4} = 30.75$th smallest

$= \frac{3}{4}$ way between 36 & 38

$= 36 + 0.75 \times (38-36) = 36 + 0.75 \times 2$

$= 37.5\,/\!/$

(iii) Use the rule.
Mild Outlier if data $< Q_1 - 1.5(Q_3 - Q_1)$
or data $> Q_3 + 1.5(Q_3 - Q_1)$

$Q_1 - 1.5(Q_3 - Q_1) = 16.25 - 1.5(37.5 - 16.25)$
$= 16.25 - 1.5 \times 21.25$
$= 16.25 - 31.875$
$= -15.625$

$Q_3 + 1.5(Q_3 - Q_1) = 37.5 + 31.875 = 69.375$

There are no observations less than -15.625 or greater than 69.375 so no mild outliers so no extreme outliers either.

(iv) See graph paper.

(v) a) Data is widely spread from 10 to 44
   b) There are 2 peaks (bimodal)
   c) The distribution is symmetric
   d) There are no gaps.
   e) There are no outliers.

2

(a) Minimum = 80   Maximum = 510   n = 36

$\sqrt{36} = 6$ rows

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0 | 8 8 9
1 | 2 2 3 4 7 8 8 9
2 | 0 1 3 4 4 5 6 7 8 8 9
3 | 1 1 1 3 4 7 8 9
4 | 1 2 3 7 8
5 | 1
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Stem Unit = 100
Leaf Unit = 10

(b) Stem & Leaf is unimodal (one peaked), symmetric and has no outliers so mean & sd are the appropriate measures of location & spread respectively.

$n = 36$ $\Sigma x = 9690$ $\Sigma x^2 = 3099100$

$$\bar{x} = \frac{\Sigma x}{n} = \frac{9690}{36} = 269.2 \; //$$

$$S = \sqrt{\frac{1}{n-1}\left[\Sigma x^2 - \frac{(\Sigma x)^2}{n}\right]} = \sqrt{\frac{1}{35}\left[3099100 - \frac{9690^2}{36}\right]}$$

$$= \sqrt{\frac{1}{35}\left[3099100 - 2608225\right]} = \sqrt{\frac{490875}{35}}$$

$$= \sqrt{14025} = 118.4 \; //$$