1. Mean for Philip = 19.2

Mean for Matthews = 20.4
Arithmatic mean

Median for Philip = 20
" for Matthews = 25
] middle value after sorting

Mode for Philip = 20 → most occuring
" " Matthews = 30 → first value

Range = Max − Min = 21 − 15 = 6
for Philip

Range for Matthews = 30 − 0 = 30

In order to measure consistency, we need to calculate std for both Philip & Matthews.

$$\text{Var}_P = \frac{1}{5}\left[(15-19.2)^2 + (21-19.2)^2 + 3(20-19.\right.$$

$$= \frac{1}{5}\left[17.64 + 3.24 + 1.92\right]$$

$$= 4.56$$

$$\text{std}_P = 2.14 \quad (\sqrt{4.51})$$

$$\text{Var}_M = \frac{1}{5}\left[(30-20.4)^2 + (25-20.4)^2 + (12-20.4)^2 + (35-20.4)^2 + (0-20.4)^2\right]$$

$$= \frac{1}{5}\left[92.16 + 21.16 + 70.56 + 213.16 + 416.16\right]$$

$$= 162.64$$

$$\text{std}_M = \sqrt{162.64} = 12.75$$

Seeing both the range & standard deviation, we can say that Philip is more consistent

2. 65 72 58 77 → 58 65 72 77

a) Mean of first 4 matches = $\frac{65+72+58+77}{4}$

$= 68$

Median $= \frac{72+58}{2} = \frac{65+72}{2} = 68.5$

b) new mean after 5th match = $\frac{65+72+58+77+70}{5}$

$= 68.4$

58 65 70 72 77

new median = 70.

c) Median is increased by 1.5 runs

3. 8 6 2 4 6 8 10 8

Mode = 8

4. ~~8.5~~ Arranging the scores in ascending order.

0 0 5.25 5.5 6 6 6.5 6.75 7 7.5 7.5
8.5 8.5 8.75 8.75 9 9.5 9.5 10 10 10 10.5 10.5 11

spread = max − min = 11 − 0 = 11

$Q_1 = \frac{n+1}{4}$ th $= \frac{25+1}{4} = 6.5$ th element

$\simeq$ ~~6.5 6.75~~

$Q_2 = 2\left(\frac{n+1}{4}\right)$ th $= 2\left(\frac{26}{4}\right) = 13$ th element

$\simeq 8.5$

$Q_3 = 3\left(\frac{n+1}{4}\right)$ th $= 3\left(\frac{26}{4}\right) = 19.5$ th element

~~8 8~~

5. $\text{range}_1 = \text{max} - \text{min} = 43 - 29 = 14$

$\text{range}_2 = 40 - 20 = 20$
$\text{range}_3 = 41 - 23 = 18$
$\text{range}_4 = 37 - 20 = 17$
$\text{range}_5 = 43 - 19 = 24$

city 3 & city 4 are close

$mean_1 = 33.83$

$mean_2 = 31.58$

$mean_3 = 32.91$

$mean_4 = 29.75$

$mean_5 = 31.66$

city 2 & city 5 are close.

$\sigma_1 =$

$var_1 = \frac{1}{12}\left[(29-33.83)^2 + \right.$

calculating standard deviation using Python since it is a huge set.

$\sigma_1 = 4.15$

$\sigma_2 = 6.21$

$\sigma_3 = 5.66$

$\sigma_4 = 5.1$

$\sigma_5 = 6.76.$

city 2 & city 3 are close

$(6.21 - 5.66) = 0.5$

$\sigma_3 - \sigma_4 = 0.51$

Formula: $Variance = \frac{1}{n}\sum_{i=1}^{n}(x_i - \mu)^2$

Standard deviation $= \sqrt{variance}$

6. 82 72 85 14, 66.

$$\text{Mean} = \frac{82+72+85+14+66}{5}$$

$$= 63.8$$

$$\text{Var} = \frac{1}{5}\left[(82-63.8)^2+(72-63.8)^2+(85-63.8)^2+(14-63.8)^2+(66-63.8)^2\right]$$

$$= \frac{1}{5}\left[331.24+67.24+449.24+2480.04+4.84\right]$$

$$= 666.52$$

$$\sigma = \sqrt{666.52} = 25.81$$

$$Z_1 = \frac{82-63.80}{25.81} = 0.70$$

$$Z_2 = \frac{72-63.80}{25.81} = 0.31$$

$$z_3 = \frac{85 - 63.8}{25.81} \simeq 0.82$$

$$z_4 = \frac{14 - 63.8}{25.81} \simeq -1.92$$

$$z_5 = \frac{66 - 63.8}{25.81} \simeq 0.08$$

7. $\mu_A = 0.7$, $\sigma_A = 0.2$

$\mu_B = 0.4$, $\sigma_B = 0.1$

$$z_A = \frac{0.75 - 0.7}{0.2} = 0.25$$

$$z_B = \frac{0.55 - 0.4}{0.1} = \underline{1.5}$$

B did better than his personal record