Box-and-Whisker Plots – Day 2

Unit 8: Statistics

Draw a box-and-whisker plot for each data set.

1.

Annual Household Income

$10,650	$13,150	$18,450	$19,050	$19,300	$17,050
$6,600	$15,700	$14,900	$22,200	$24,600	$26,950
$17,200	$23,250	$15,250	$27,250		

min 6600 Q1 15075 Q2 17825 Q3 22725 max 27250

IQR = 7650

2.

Annual Precipitation (Inches)

50	18.4	23.6	33	34.2	38.2
5.8	41	39.8	64.2	38	33.8
65.2	51.8	34.2	62.2	63.2	66.2
10	9.2	12	48		

min 5.8 Q1 23.6 Q2 38.1 Q3 51.8 max 66.2

IQR = 28.2

3.

Life Expectancy

State	Years	State	Years	State	Years
Vermont	80.4	District of Columbia	77.9	Georgia	80.1
Missouri	75.9	Indiana	81.3	Nebraska	79.8
Oklahoma	78.2	Tennessee	77.9	Mississippi	74.2

min 74.2 Q1 76.9 Q2 78.2 Q3 80.25 max 81.3

IQR = 3.35

Draw a box-and-whisker plot for each data set.

4.

Nobel Laureates

Name	Age	Name	Age	Name	Age
Daniel Leigh McFadden	63	Ada E. Yonath	70	Avram Hershko	66
Desmond Mpilo Tutu	53	Henry Alfred Kissinger	50	Wole Soyinka	52
Chen Ning Yang	35	Kurt Wüthrich	64	John Charles Polanyi	57
Ryoji Noyori	63	Sidney Altman	50	George Elwood Smith	79
Michael Stuart Brown	44	Johann Deisenhofer	45	Mohammed ElBaradei	63
Robert Betts Laughlin	48				67

min 35 Q1 49 Q2 55 Q3 63.5 max 79

IQR = 14.5

5.

Injuries Due to Distracted Driving per Month

6,371	4,993	7,726	6,908	8,599	11,253
11,212	9,736	5,826	7,141	10,936	6,181
7,263	5,512	5,667	7,468	5,013	8,722
8,569	10,422	8,335	10,446	5,564	

min 4993 Q1 5826 Q2 7468 Q3 9736 Max 11253

IQR = 3910

6.

Large Cities

City	Population	City	Population	City	Population
Singapore	5,399,200	Mexico City	8,874,724	Hangzhou	3,560,391
Wuhan	6,886,253	Mumbai	12,655,220	Guangzhou	11,185,600
Giza	4,239,988	Pune	5,049,968	Bangkok	8,280,925
Jakarta	9,988,329	Lahore	11,318,745	Yokohama	3,680,267
Wenzhou	3,039,439	Seoul	10,388,055	Bogotá	7,776,845
Dar es Salaam	4,364,541	São Paulo	11,895,893	Lagos	17,060,307
Pyongyang	3,255,388	Delhi	11,007,835	Cairo	8,922,949

min 3,039,439 Q1 4,302,264.5 Q2 8,280,925 Q3 11,096,717.5 max 17,060,307

IQR = 6,794,453

① 16 total numbers

Lower half of data (8 numbers)

6600, 10650, 13150, 14900, 15250, 15700, 17050, 17200

min ↗ ↑ Lower Quartile (Q1)

$$\frac{14900 + 15250}{2} = \frac{30150}{2} = 15075$$

Median: (Q2)

$$\frac{\text{Last of lower} + \text{First of upper}}{2} = \frac{17200 + 18450}{2} = \frac{35650}{2} = 17825$$

Upper half of data (8 numbers)

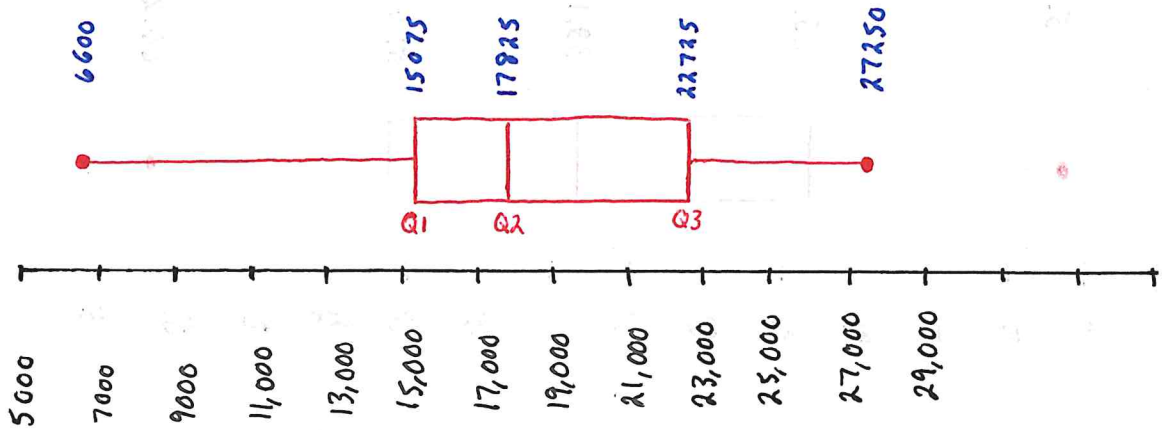
18450, 19050, 19300, 22200, 23250, 24600, 26950, 27250 ↖ max

↑ Upper Quartile (Q3)

$$\frac{22200 + 23250}{2} = \frac{45450}{2} = 22725$$

$$IQR = Q3 - Q1 = 22725 - 15075 = \boxed{7650}$$

$$\text{Range} = \text{Max} - \text{Min} = 27250 - 6600 = 20650$$



(2) 22 total numbers.

Lower half of data (11 numbers)

5.8, 9.2, 10, 12, 18.4, 23.6, 33, 33.8, 34.2, 34.2, 38

min

Lower Quartile (Q1)

Median (Q2)

$$\frac{\text{Last of Lower} + \text{First of Upper}}{2} = \frac{38 + 38.2}{2} = \frac{76.2}{2} = 38.1$$

Upper half of data (11 numbers)

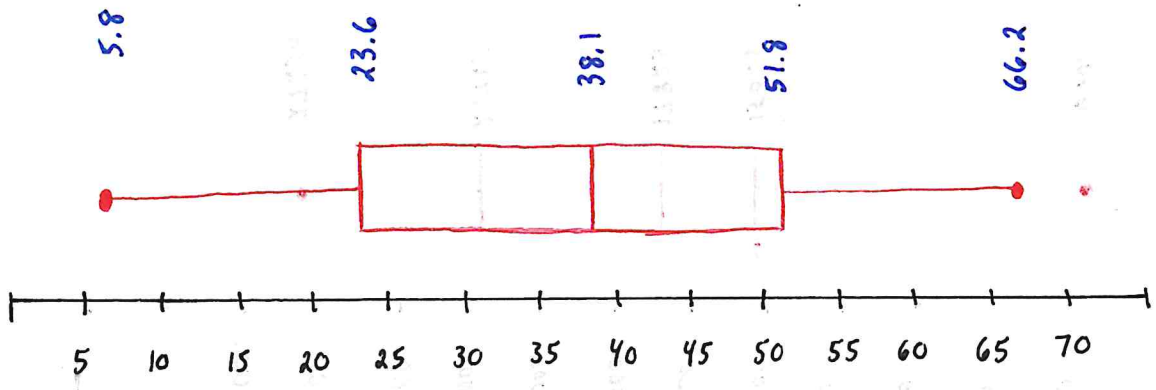
38.2, 39.8, 41, 48, 50, 51.8, 62.2, 63.2, 64.2, 65.2, 66.2

Upper Quartile (Q3)

max

$$IQR = Q3 - Q1 = 51.8 - 23.6 = 28.2$$

$$\text{Range} = \text{Max} - \text{Min} = 66.2 - 5.8 = 60.4$$



(3) 9 total numbers

Lower half of data (4 numbers)

74.2, 75.9, 77.9, 77.9

min

Lower Quartile (Q1)

$$\frac{75.9 + 77.9}{2} = \frac{153.8}{2} = 76.9$$

Median (Q2)

78.2

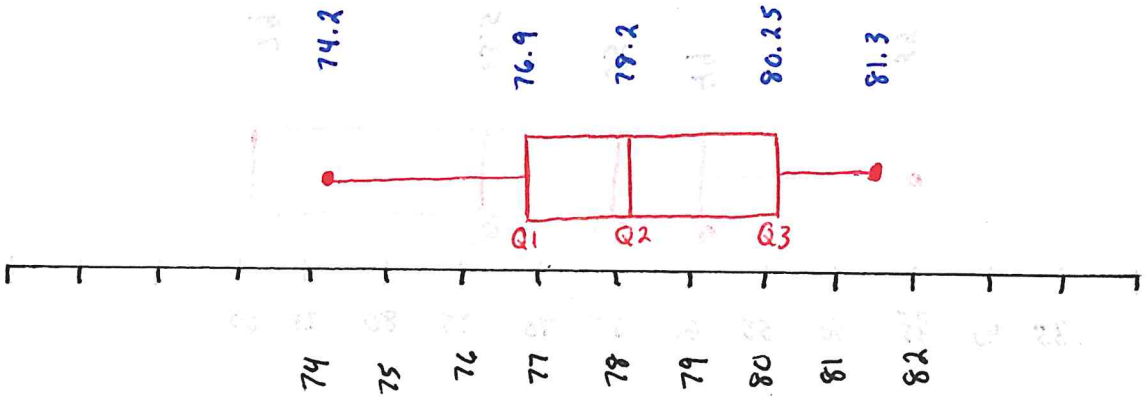
Upper half of data (4 numbers)

79.8, 80.1, 80.4, 81.3 ← max

$$\frac{80.1 + 80.4}{2} = \frac{160.5}{2} = 80.25$$

$$IQR = Q3 - Q1 = 80.25 - 76.9 = 3.35$$

$$\text{Range} = \text{Max} - \text{min} = 81.3 - 74.2 = 7.1$$



(4) 16 total numbers

Lower half of data (8 numbers)

35, 44, 45, 48, 50, 50, 52, 53

↑ Lower Quartile (Q1)

$\frac{48+50}{2} = \frac{98}{2} = 49$

Median: (Q2)

$\frac{\text{Last of lower} + \text{First of upper}}{2} = \frac{53+57}{2} = \frac{110}{2} = 55$

Upper half of data (8 numbers)

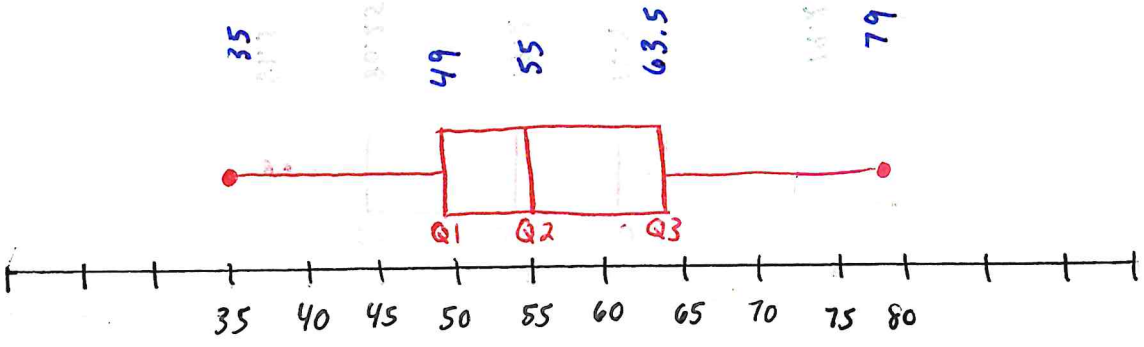
57, 63, 63, 63, 64, 66, 70, 79

↑ Upper Quartile (Q3)

$\frac{63+64}{2} = \frac{127}{2} = 63.5$

$IQR = Q3 - Q1 = 63.5 - 49 = \boxed{14.5}$

Range = Max − Min = 79 − 35 = 44



⑤ 23 total numbers

Lower half of data (11 numbers)

4993, 5013, 5512, 5564, 5667, 5826, 6181, 6371, 6908, 7141, 7263

↑ Lower Quartile (Q1)

Median (Q2)

7468

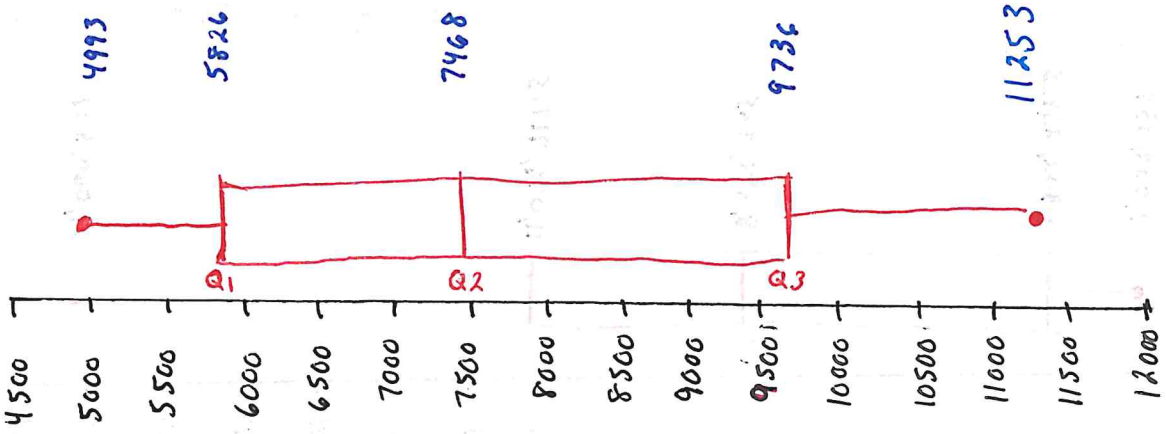
Upper half of data (11 numbers)

7726, 8335, 8569, 8599, 8722, 9736, 10422, 10446, 10936, 11212, 11253

↑ upper Quartile (Q3)

$IQR = Q3 - Q1 = 9736 - 5826 = \boxed{3910}$

$Range = Max - Min = 11253 - 4993 = 6260$



⑥ 21 total numbers

3,039,439
3,255,388
3,560,391
3,680,267
4,239,988 ←
4,364,541
5,049,968
5,399,200
6,886,253
7,776,845
8,280,925 ← Median Q2
8,874,724
8,922,949
9,988,329
10,388,055
11,007,835 ←
11,185,600
11,318,745
11,895,893
12,655,220
17,060,307

Lower half of data

Lower Quartile (Q1)

$$\frac{4239988 + 4364541}{2} = \frac{8604529}{2} = 4,302,264.5$$

Upper half of data

Upper Quartile (Q3)

$$\frac{11007835 + 11185600}{2} = \frac{22193435}{2} = 11,096,717.5$$

$$IQR = Q3 - Q1 = 11,096,717.5 - 4,302,264.5$$
$$= \boxed{6,794,453}$$

$$\text{Range} = \text{Max} - \text{Min} = 17,060,307 - 3,039,439$$
$$= 14,020,868$$