Basic statistics: average condition

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❑ **What statistics do represent the average condition?**

❑ Mean

❑ Median

❑ Mode

❑ **Mean**
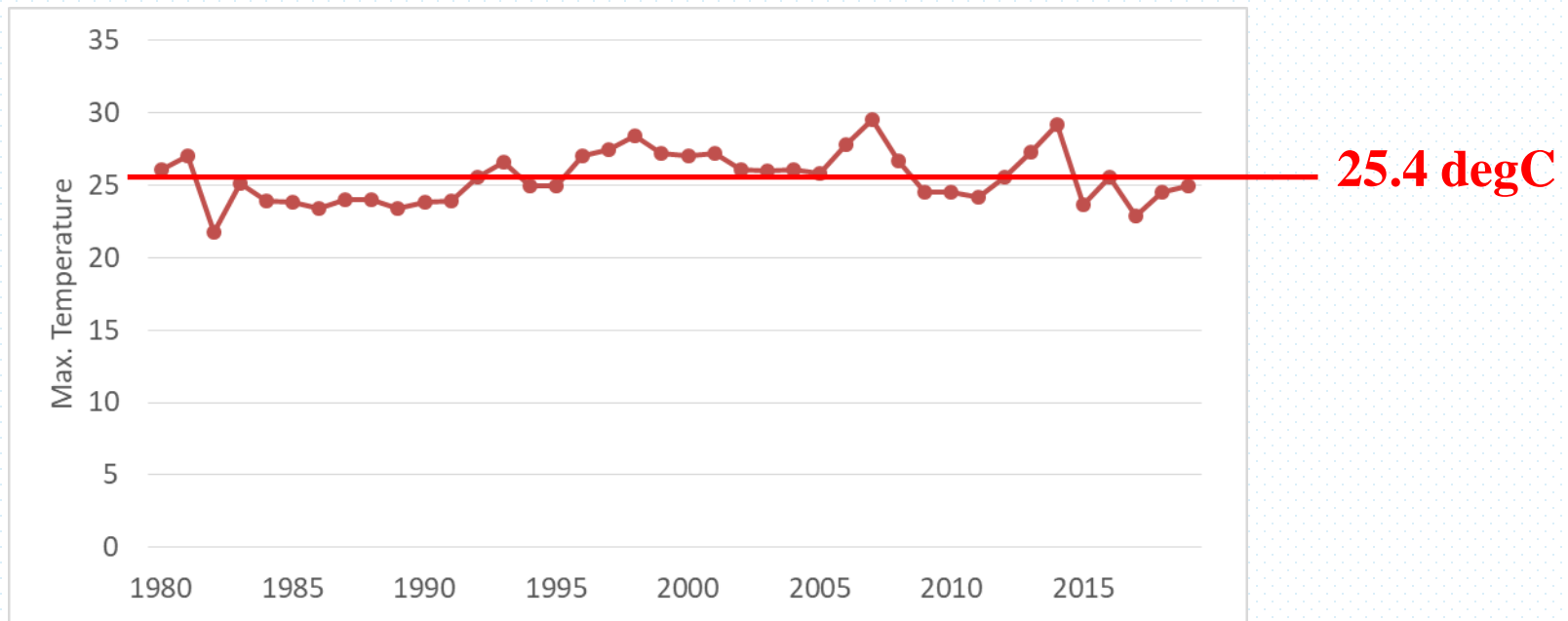
$$\overline{x} = \frac{1}{n} \sum_{t=1}^{n} x_t$$

X_t = time series

$$t = 1, 2, 3, \cdots, n$$

First, calculate the sum of x_t. After that, the sum is divided by the number of values.

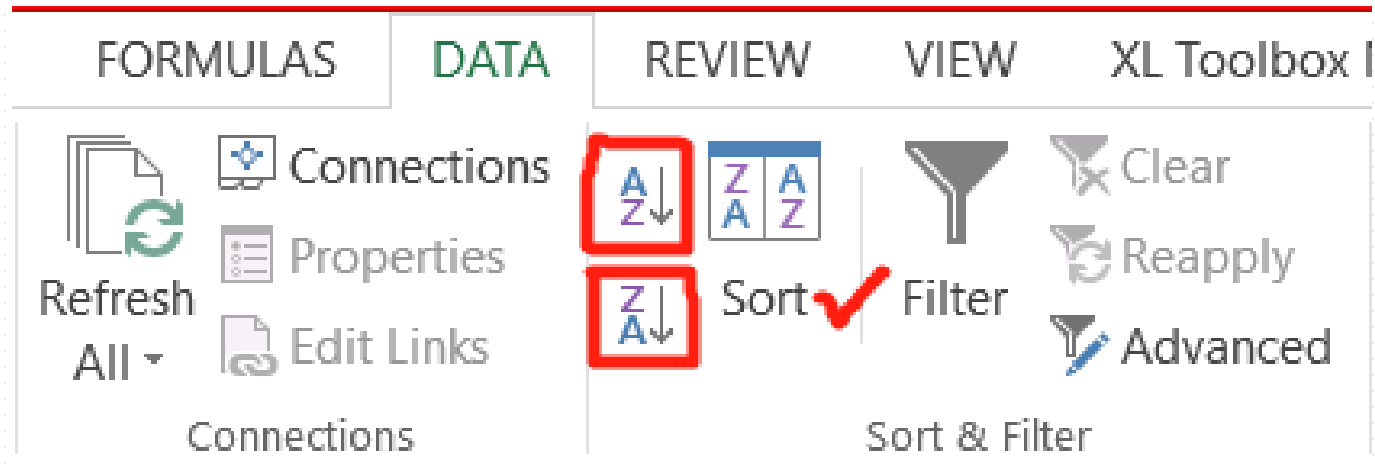Note: Mean is influenced by missing value

❑ **Mean**

25.4 degC

Annual mean maximum temperature in Barisal

In meteorology, mean reflects the climatic status of the element.

❑ **Data sort**
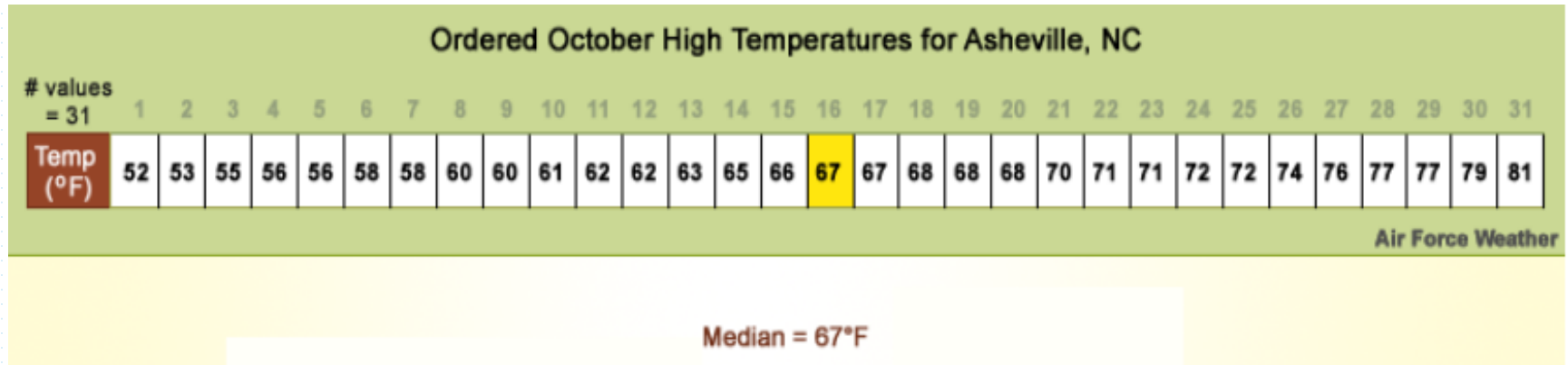
Data can be sorted by ascending or descending order

❑ **Median**

The median is the value in the centre of the population when the sample values x_t (t = 1, 2. . . N) are arranged in ascending (or descending) order.

If N is odd : the median is equal to $X_{(N+1)/2}$

For the 31day temperature series, the median is the middle value.

Ordered October High Temperatures for Asheville, NC

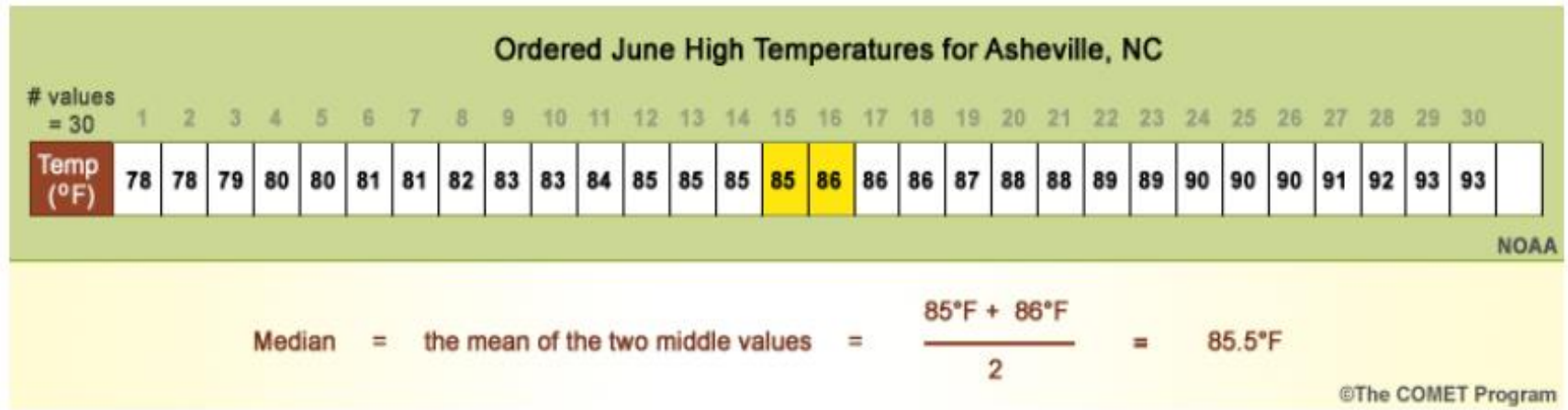| # values = 31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Temp (°F)	52	53	55	56	56	58	58	60	60	61	62	62	63	65	66	67	67	68	68	68	70	71	71	72	72	74	76	77	77	79	81

Air Force Weather

Median = 67°F

Adapted from professor Liping Li, NUIST, China

❑ Median

If N is even: the median of the sample is usually taken to be

$(x_{N/2} + x_{N/2+1})/2$

Ordered June High Temperatures for Asheville, NC

# values = 30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Temp (°F)	78	78	79	80	80	81	81	82	83	83	84	85	85	85	85	86	86	86	87	88	88	89	89	90	90	90	91	92	93	93

NOAA

Median = the mean of the two middle values = $\dfrac{85°F + 86°F}{2}$ = 85.5°F

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The advantage: the median is not influenced by extreme values occurring in the sample.

Adapted from professor Liping Li, NUIST, China

❑ **Mode**

The modes are the most frequently occurring value in the sample. If two or more values are equally the most frequent, there will be two or more modes for the sample.

3 3 3 3 3 4 5 3 3 1

In meteorology, mode is mostly used to summarise wind direction.

Acknowledgement

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