TUGAS 3

Anggota :

1. **Ahmad Idza Anafin / 5027241017**
2. **Paundra Pujo Darmawan / 5027241008**
3. **Nafis Faqih Allmuzaky M. / 5027241095**
4. **M Fatihul Qolbi Ash Shiddiqi / 5027241023**

EXERCISE 1

Find the Variance and standart deviation of the following data:

A. 1,3,3,4,5,5,6,7,7,7
B. 2,5,11,14,14,22,37

Answer :

A. $\bar{X} = \dfrac{1+3+3+4+5+5+6+7+7+7}{10} = 4,8$

$$\text{Variance} \rightarrow S^2 = \dfrac{\sum(xi-\bar{x})^2}{n}$$

$$S^2 = \dfrac{(1-4,8)^2+(3-4,8)^2+(3-4,8)^2+(4-4,8)^2+(5-4,8)^2+(5-4,8)^2+(6-4,8)^2+(7-4,8)^2+(7-4,8)^2+(7-4,8)^2}{10}$$

$$S^2 = \dfrac{(-3,8)^2+(-1,8)^2+(-1,8)^2+(-0,8)^2+(0,2)^2+(0,2)^2+(1,2)^2+(2,2)^2+(2,2)^2+(2,2)^2}{10} = \dfrac{94}{25} = 3,76$$

$$\text{Standart Deviation} \rightarrow \sigma = \sqrt{\dfrac{\sum(xi-\bar{x})^2}{n}}$$

$$\sigma = \sqrt{\dfrac{\sum(xi-\bar{x})^2}{n}} = \sqrt{\dfrac{94}{25}} = \dfrac{\sqrt{94}}{5} \approx 1,93$$

B. $\bar{X} = \frac{2+5+11+14+14+22+37}{7} = 15$

$$\text{Variance} \rightarrow s^2 = \frac{\sum(xi-\bar{x})^2}{n}$$

$$s^2 = \frac{(2-15)^2+(5-15)^2+(11-15)^2+(14-15)^2+(14-15)^2+(22-15)^2+(37-15)^2}{7}$$

$$s^2 = \frac{(-13)^2+(-10)^2+(-4)^2+(-1)^2+(-1)^2+(7)^2+(12)^2}{7} = \frac{480}{7} = 68,57$$

$$\text{Standart Deviation} \rightarrow \sigma = \sqrt{\frac{\sum(xi-\bar{x})^2}{n}}$$

$$\sigma = \sqrt{\frac{\sum(xi-\bar{x})^2}{n}} = \sqrt{\frac{480}{7}} = \frac{4\sqrt{210}}{7} \approx 8,28$$

EXERCISE 2

The price of milk in shops are as follow

49   44   41   52   47   43

    a) **Find mean and standart deviation of the prices of milk**
    b) **The prices of sugar in shops have an average proof of 52p and a standart deviation of 3.9. Make two valid comparisons between the prices of milk and sugar**

Answer :

    a) $\bar{X} = \frac{49+44+41+52+47+43}{6} = 46$

$$\text{Standart Deviation} \rightarrow \sigma = \sqrt{\frac{\sum(xi - \bar{x})^2}{n}}$$

$$\sigma = \sqrt{\frac{(49-46)^2 + (44-46)^2 + (41-46)^2 + (52-46)^2 + (47-46)^2 + (43-46)^2}{6}}$$

$$\sigma = \sqrt{\frac{9+4+25+36+1+9}{6}} = \sqrt{14} \approx 3,74$$

b) Dalam hal ini dapat dibandingkan bahwa harga susu rata-rata adalah 46p dengan standar deviasi 3,74 sedangkan gula dengan harga 52p dengan standar deviasi 3,9.

Jadi, bisa disimpulkan bahwa standar deviasi susu relatif kecil terhadap rata ratanya sehingga membuktikan bahwa persebaran data tersebut **memusat**, sebaliknya dikarenakan standar deviasi gula relatif besar terhadap rata ratanya sehingga membuktikan bahwa persebaran data tersebut **menyebar**.

EXERCISE 3
3. The prices (in pounds) of 6 two-bedroom flats in Glasgow are as follows

85000 98000 140000 110000 120000

a) Calculate the mean and standard deviation of the prices of the flats.

b) The mean price for a two - bedroom flat in Edinburgh is £128000 and the standard deviation is £2600. Make two valid comparisons about the prices of flats in Glasgow and Edinburgh

Jawab =

```python
import numpy as np

glasgow_prices = np.array([85000, 98000, 140000, 110000, 120000])

mean_glasgow = np.mean(glasgow_prices)
std_dev_glasgow = np.std(glasgow_prices, ddof=1)

mean_edinburgh = 128000
std_dev_edinburgh = 2600

print(f"Mean harga flat di Glasgow: £{mean_glasgow:.2f}")
print(f"Deviasi standar harga flat di Glasgow: £{std_dev_glasgow:.2f}")

print("\nPerbandingan:")
print(f"1. Harga rata-rata flat di Glasgow (£{mean_glasgow:.2f}) lebih rendah
    daripada di Edinburgh (£{mean_edinburgh:.2f}).")
print(f"2. Deviasi standar harga flat di Glasgow (£{std_dev_glasgow:.2f}) lebih
    tinggi daripada di Edinburgh (£{std_dev_edinburgh:.2f}).")
```

```
Mean harga flat di Glasgow: £110600.00
Deviasi standar harga flat di Glasgow: £21019.04

Perbandingan:
1. Harga rata-rata flat di Glasgow (£110600.00) lebih rendah daripada di Edinburgh
   (£128000.00).
2. Deviasi standar harga flat di Glasgow (£21019.04) lebih tinggi daripada di
   Edinburgh (£2600.00).

=== Code Execution Successful ===
```

a. Rata-rata harga adalah £110600

Devisiasi standar adalah £21019.04.

b.Harga rata-rata flat di Glasgow (£110600.00) lebih rendah daripada di Edinburgh (£128000.00).

Deviasi standar harga flat di Glasgow (£21019.04) lebih tinggi daripada di Edinburgh (£2600.00).

EXERCISE 4
Given below is the previous sample of monthly rents for 70 efficiency apartments, presented here as grouped data in the form of a frequency distribution. Calculate the mean of the grouped data and compare it to the actual sample mean.

Rent ($)	Frequency
420-439	8
440-459	17
460-479	12
480-499	8
500-519	7
520-539	4
540-559	2
560-579	4
580-599	2
600-619	6

Answer :

Diketahui : $ftotal = 70$

Ditanya : x̄ dan μ?

Jawab :
a) Menghitung rata rata populasi

Price($)	xi	fi	$fi . xi$
420-439	429,5	8	3436
440-459	449,5	17	7641,5
460-479	469,5	12	5634
480-499	489,5	8	3916
500-519	509,5	7	3566,5

520-539	529,5	4	2118
540-559	549,5	2	1099
560-579	569,5	4	2278
580-599	589,5	2	1179
600-699	609,5	6	3657
		70	34525

$$\mu = \frac{\sum fi \cdot xi}{\sum fi} = \frac{34525}{70} \approx 493,21$$

b) Menghitung rata rata sampel

Price($)	xi	fi	$fi \cdot xi$
420-439	429,5	4	1718
440-459	449,5	10	4495
460-479	469,5	10	4695
480-499	489,5	6	2937
500-519	509,5	5	2547,5
520-539	529,5	3	1588,5
540-559	549,5	2	1099
560-579	569,5	4	2278
580-599	589,5	2	1179
600-699	609,5	4	2438
		50	24975

$$\bar{X} = \frac{\sum fi \cdot xi}{\sum fi} = \frac{24975}{50} \approx 499,5$$

Jadi, dapat disimpulkan pembandingan sebuah data dengan rata rata sampel maupun rata rata populasi sebagai berikut :

Jika kita menghitung rata-rata menggunakan seluruh populasi, maka kita mendapatkan rata-rata yang benar-benar mewakili semua data (rata-rata populasi) dalam hal ini pasti hasilnya lebih akurat.

Namun, jika kita hanya menggunakan sebagian data (sampel), maka rata-rata sampel hanya merupakan perkiraan dari rata-rata populasi. Jika ukuran sampel cukup besar dan representatif, maka rata-rata sampel cenderung mendekati rata-rata populasi. Namun, semakin kecil sampelnya, semakin besar kemungkinan perbedaan antara kedua rata-rata tersebut.

EXERCISE 5

Diberikan data

{65, 70, 75, 80, 85, 90, 95, 100, 70, 85, 80, 75, 90, 85, 100, 95, 85, 90, 70, 75}

- Buat frekuensi tabel persebaran data

```
import pandas as pd

data = [65, 70, 75, 80, 85, 90, 95, 100, 70, 85, 80, 75, 90, 85, 100, 95, 85, 90, 70, 75]

tabel = pd.Series(data).value_counts().sort_index()
print(f"Tabel Persebaran data\n\n{tabel}")
```

```python
import pandas as pd
import matplotlib.pyplot as plt
data = [65, 70, 75, 80, 85, 90, 95, 100, 70, 85, 80, 75, 90, 85, 100, 95, 85, 90, 70, 75]

tabel = pd.Series(data).value_counts().sort_index()
print(f"Tabel Persebaran data\n\n{tabel}")
```

```
Tabel Persebaran data

65      1
70      3
75      3
80      2
85      4
90      3
95      2
100     2
```

- Buat histogram

```python
import matplotlib.pyplot as plt

data = [65, 70, 75, 80, 85, 90, 95, 100, 70, 85, 80, 75, 90, 85, 100, 95, 85, 90, 70, 75]

plt.figure(figsize=(8, 6))
plt.hist(data, bins=7, edgecolor='black', alpha=0.7)
plt.title('Histogram')
plt.xlabel('Nilai')
plt.ylabel('Frekuensi')
plt.grid(False)
plt.show()
```

```
plt.figure(figsize=(8, 6))
plt.hist(data, bins=7, edgecolor='black', alpha=0.7)
plt.title('Histogram')
plt.xlabel('Nilai')
plt.ylabel('Frekuensi')
plt.grid(False)
plt.show()
```
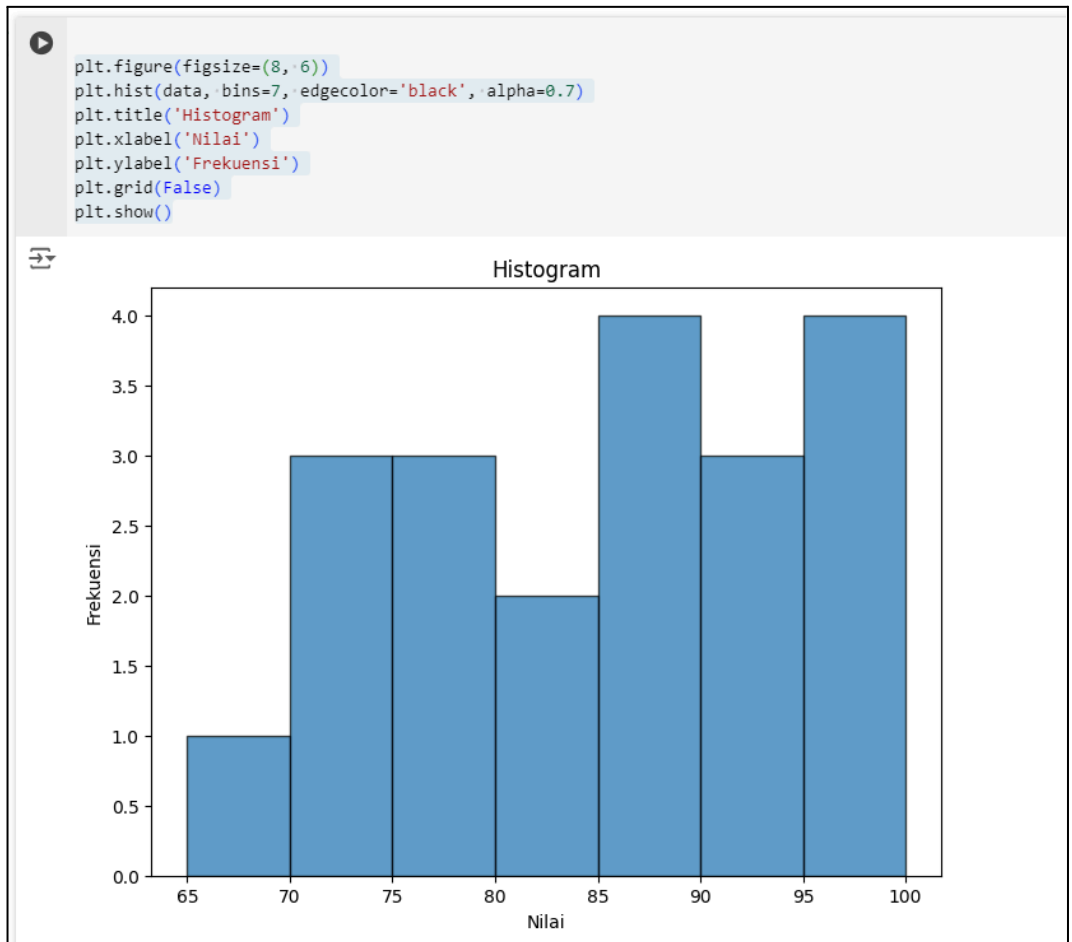

- Buat poligon frekuensi

```
import matplotlib.pyplot as plt

data = [65, 70, 75, 80, 85, 90, 95, 100, 70, 85, 80, 75, 90, 85, 100, 95, 85, 90, 70, 75]

freq_table= pd.Series(data).value_counts().sort_index()

plt.figure(figsize=(8, 6))
plt.plot(freq_table.index, freq_table.values, marker='o', linestyle='-', color='b')
plt.title('Poligon Frekuensi')
plt.xlabel('Nilai')
plt.ylabel('Frekuensi')
```

```
plt.grid(False)
plt.show()
```

```
plt.figure(figsize=(8, 6))
plt.plot(freq_table.index, freq_table.values, marker='o', linestyle='-', color='b')
plt.title('Poligon Frekuensi')
plt.xlabel('Nilai')
plt.ylabel('Frekuensi')
plt.grid(False)
plt.show()
```