

- The **pth percentile** of a dataset is the value below which a certain percent (p) of the observations fall.
- To find the location of the p th percentile in a dataset, you can follow these steps:
- **Step 1:** Arrange the data in ascending order.
- **Step 2:** Calculate the index for the p th percentile using the formula:
- **Index** = $p/100 * (n + 1)$

where:

p is the desired percentile (between 0 and 100),

n is the number of data points in the dataset.

- **Step 3:** If the index obtained in Step 2 is an **integer**, that is the **position** of the p th percentile in the ordered dataset.
- **Step 4:** If the **index is not an integer**, round it down to the nearest whole number (j) and take the next number (k). The p th percentile is then estimated by **linear interpolation** between the j th and k th values in the ordered dataset.

▪ Example

For example, let's say we have a dataset with 7 values ($n = 7$), and we want to find the 30th percentile ($p = 30$).

Step 1: Arrange the data in ascending order. Let's say our ordered data is: **2, 4, 6, 8, 10, 12, 14**.

Step 2: Calculate the index: Index = $30/100 * (7 + 1) = 2.4$

Step 3: Since the index is not an integer, we round it down to the nearest whole number, which is 2 (j), and take the next number, which is 3 (k).

Step 4: The 30th percentile is then estimated by linear interpolation between the 2nd and 3rd values in the ordered dataset. So, the 30th percentile is $4 + 0.4 * (6 - 4) = 4.8$.

So, the 30th percentile of this dataset is 4.8.

▪ Example

Suppose we have a dataset with 10 values ($n = 10$), and we want to find the 75th percentile ($p = 75$).

Step 1: Arrange the data in ascending order. Let's say our ordered data is: **1, 2, 3, 4, 5, 6, 7, 8, 9, 10**.

Step 2: Calculate the index: Index = $75/100 * (10 + 1) = 8.25$

Step 3: Since the index is not an integer, we round it down to the nearest whole number, which is 8 (j), and take the next number, which is 9 (k).

Step 4: The 75th percentile is then estimated by linear interpolation between the 8th and 9th values in the ordered dataset. So, the 75th percentile is $8 + 0.25 * (9 - 8) = 8.25$.

So, the 75th percentile of this dataset is 8.25. This method is consistent with the previous example and confirms the process for finding the p th percentile in a dataset.

- 1) What is **Q1** in the following data set: **1, 2, 3, 4, 5, 6, 7, 8, 9, 10**?
 - (a) 2.75
 - (b) 3.5
 - (c) 4.5
 - (d) 5.5
- 2) What is **Q2** in the following data set: **1, 2, 3, 4, 5, 6, 7, 8, 9, 10**?
 - (a) 4.5
 - (b) 5.5
 - (c) 6.5
 - (d) 7.5
- 3) What is **Q3** in the following data set: **1, 2, 3, 4, 5, 6, 7, 8, 9, 10**?
 - (a) 6.5
 - (b) 7.5
 - (c) 8.25
 - (d) 9.5
- 4) What is the **20th percentile** of the following data set: **1, 2, 3, 4, 5, 6, 7, 8, 9, 10**?
 - (a) 2
 - (b) 2.2
 - (c) 3
 - (d) 3.5
- 5) What is the **90th percentile** of the following data set: **1, 2, 3, 4, 5, 6, 7, 8, 9, 10**?
 - (a) 8.5
 - (b) 9
 - (c) 9.5
 - (d) 9.9

- 6) A computer science class has 10 students who scored the following marks in a test: **50, 60, 70, 80, 90, 100, 110, 120, 130, 140**. What is the first quartile (**Q1**) of the scores?
- 67.5
 - 70
 - 75
 - 80
- 7) In a computer networking course, the time taken (in milliseconds) by 9 packets to travel from a server to a client was recorded as: 10, 20, 30, 40, 50, 60, 70, 80, 90. What is the median (**Q2**) time?
- 40
 - 50
 - 60
 - 70
- 8) An electrical engineering student measures the resistance (in ohms) of 7 resistors: 10, 20, 30, 40, 50, 60, 70. What is the third quartile (**Q3**) of the resistances?
- 50
 - 60
 - 70
 - 80
- 9) A computer scientist records the time (in seconds) it takes for an algorithm to sort 8 different arrays: 1, 2, 3, 4, 5, 6, 7, 8. What is the interquartile range (**IQR**) of the times?
- 3.5
 - 4
 - 4.5
 - 5
- 10) In a digital electronics course, the voltage (in volts) of 5 different signals was measured as: 1, 2, 3, 4, 5. What is the 60th percentile of the voltages?
- 3
 - 3.2
 - 3.4
 - 3.6
- 11) A computer science student runs a program 6 times, recording the following runtimes (in seconds): 10, 20, 30, 40, 50, 60. What is **Q1** of the runtimes?
- 15
 - 17.5
 - 25
 - 30
- 12) An electrical engineer measures the current (in amperes) in a circuit 6 times, getting the following measurements: 1, 2, 3, 4, 5, 6. What is **Q2** of the measurements?
- 3
 - 3.5
 - 4
 - 4.5
- 13) A computer scientist measures the time (in milliseconds) it takes for a function to execute 7 times: 10, 20, 30, 40, 50, 60, 70. What is **Q3** of the times?
- 50
 - 55
 - 60
 - 65
- 14) An electrical engineer measures the resistance (in ohms) of 5 resistors: 10, 20, 30, 40, 50. What is the **IQR** of the resistances?
- 20
 - 25
 - 30
 - 35
- 15) In a computer networking course, the time taken (in milliseconds) by 5 packets to travel from a server to a client was recorded as: 10, 20, 30, 40, 50. What is the 80th percentile of the times?
- 40
 - 42
 - 44
 - 48
- 16) A computer science student records the time (in seconds) it takes for an algorithm to sort 6 different arrays: 1, 2, 3, 4, 5, 6. What is **Q1** of the times?
- 1.75
 - 2
 - 2.5
 - 3
- 17) An electrical engineering student measures the current (in amperes) in a circuit 7 times, getting the following measurements: 1, 2, 3, 4, 5, 6, 7. What is **Q2** of the measurements?
- 3
 - 4
 - 5
 - 6
- 18) A computer scientist measures the time (in milliseconds) it takes for a function to execute 8 times: 10, 20, 30, 40, 50, 60, 70, 80. What is **Q3** of the times?
- 62.5
 - 65

(c) 67.5

(d) 70

19) An electrical engineer measures the resistance (in ohms) of 6 resistors: 10, 20, 30, 40, 50, 60. What is the IQR of the resistances?

(a) 25

(b) 30

(c) 35

(d) 40

20) In a digital electronics course, the voltage (in volts) of 6 different signals was measured as: 1, 2, 3, 4, 5, 6. What is the 70th percentile of the voltages?

(a) 4.1

(b) 4.2

(c) 4.3

(d) 4.9