Statistics Basics (DS-11)

Correlation and Covariance

To do: Go through the activity to the end

Scatter Plot

Before we take up the discussion of correlation, we need to examine a way to display the relation between two variables x and y. The most common and easiest way is a scatter plot.

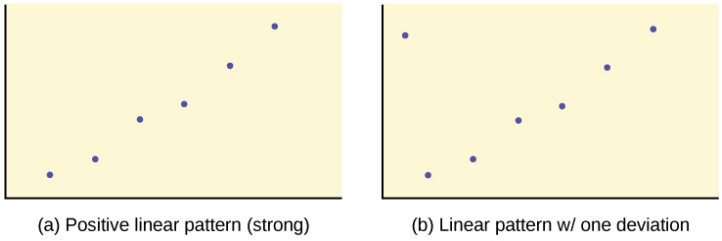
A scatter plot shows the direction of a relationship between the variables. A clear direction happens when there is either:

- High values of one variable occurring with high values of the other variable or low values of one variable occurring with low values of the other variable.
- High values of one variable occurring with low values of the other variable.

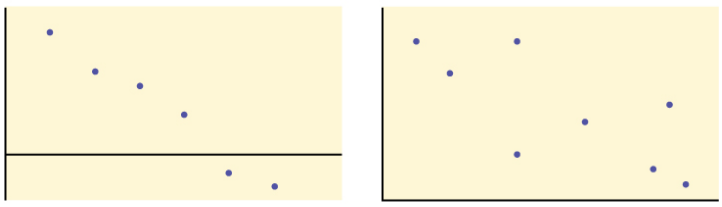
Scatter Plot
A scatter plot of two variables shows the values of one variable on the Y axis and the values of the other variable on the X axis.

You can determine the strength of the relationship by looking at the scatter plot and seeing how close the points are to a line, a power function, an exponential function, or to some other type of function. For a linear relationship there is an exception. Consider a scatter plot where all the points fall on a horizontal line providing a "perfect fit." The horizontal line would in fact show no relationship.

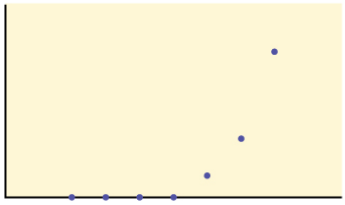
When you look at a scatterplot, you want to notice the overall pattern and any deviations from the pattern. The following scatterplot examples illustrate these concepts.



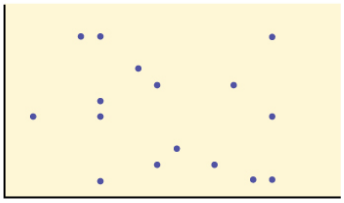
(a) Positive linear pattern (strong) (b) Linear pattern w/ one deviation



(a) Negative linear pattern (strong) (b) Negative linear pattern (weak)



(a) Exponential growth pattern



(b) No pattern

Tips:

- A **scatter plot** displays the relationship between **two numerical variables**.
- This type of plot not only shows the **functional form of the relationship** (linear or non-linear), but also gives information about the **degree of this relationship**.

Next

You have completed 0% of the lesson

Jump to...

Statistics Basics (DS-11)

Correlation and Covariance

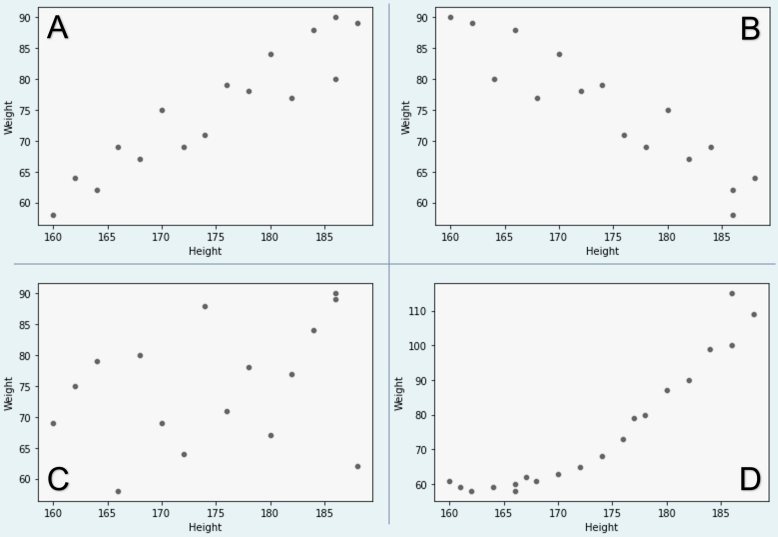
To do: Go through the activity to the end

Let's Practice

Question

Correct

Mark 1.00 out of 1.00



As the variable ***height increases***, the variable ***weight also increases***. Which scatterplot represents this relationship?

- (•) A
- ( ) B
- ( ) C
- ( ) D

Clear my choice

Check

✔ You're doing good. Let's continue.

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Previous Next

Statistics Basics (DS-11)

Correlation and Covariance

To do: Go through the activity to the end

Correlation and Covariance

Correlation is one of the most common statistical concepts. It is a statistical technique that determines how one variable changes with another variable. It gives us **the degree of the linear relationship between the two variables**.

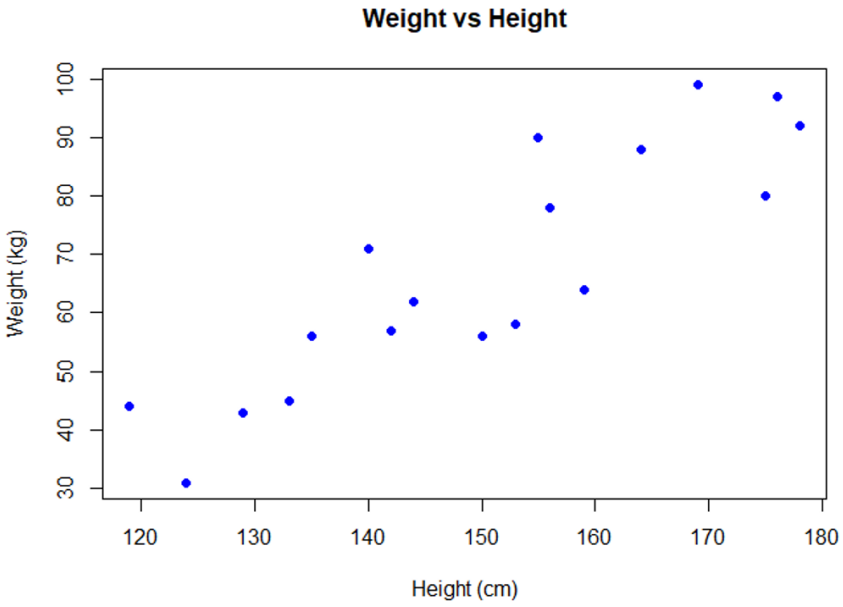
Correlation
A relation existing between phenomena or things or between mathematical or statistical variables which tend to vary, be associated, or occur together in a way not expected on the basis of chance alone.

*Source: **Definition of correlation** 2021 Merriam-Webster*

For example, consider the correlation between *height* and *weight* variables. If taller people also have more weight it can be said there is a correlation between height and weight.

Height	Weight
119	44
124	31
129	43
133	45
135	56
140	71
142	57
144	62
150	56

Height	Weight
153	58
155	90
156	78
159	64
164	88
169	99
175	80
176	97
178	92

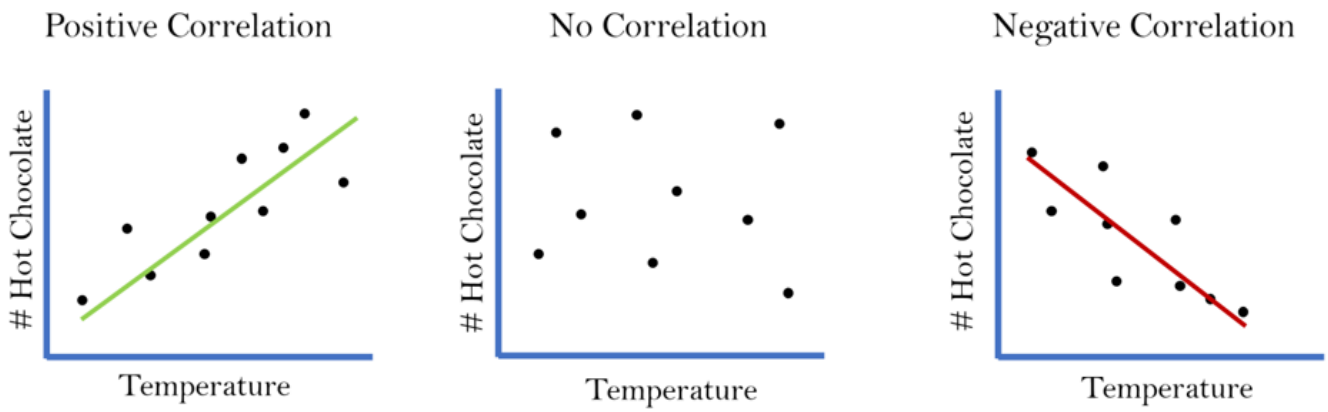


Covariance provides similar information with correlation. However, correlation goes beyond covariance and gives information also about the strength of the relationship between two variables. Covariance does not provide information about the strength of the relationship.

Covariance
The expected value of the product of the deviations of two random variables from their respective means.

*Source: **Definition of covariance** 2021 Merriam-Webster*

Both can be positive or negative. Correlation or covariance is positive if one increases the other also increases and negative if one increases the other decreases. The figure below shows the positive and negative correlations between the two variables.



Tips:

- **Covariance** shows the ***direction*** of the linear relationship between two variables.
- **Correlation** gives information about the ***direction*** and the ***strength*** of the linear relationship between two variables.

Next

You have completed 25% of the lesson

25%

Jump to...

Statistics Basics (DS-11)

Correlation and Covariance

To do: Go through the activity to the end

Formulation

Covariance is calculated as:

$$Population\ Covariance \Longrightarrow Cov(X,Y) = \frac{\sum_{i=1}^{n}(X_i - \overline{X})(Y_i - \overline{Y})}{N}$$

$$Sample\ Covariance \Longrightarrow Cov(x,y) = \frac{\sum_{i=1}^{n}(x_i - \overline{x})(y_i - \overline{y})}{n-1}$$

$$X_i = data\ value\ of\ X$$

$$Y_i = data\ value\ of\ Y$$

$$\overline{X} = mean\ of\ X$$

$$\overline{Y} = mean\ of\ Y$$

$$N = number\ of\ data\ values$$

After calculating the covariance the *correlation* is calculated as:

$$Correlation = \frac{Cov(X,Y)}{\sigma_X \sigma_Y}\ or\ \frac{Cov(x,y)}{s_x s_y}$$

We can say correlation is calculated by the division of covariance by the standard deviation of variables. Because the correlation is a number between -1 and 1 it is often referred to as the **correlation coefficient**.

As we said earlier; covariance and correlation provide similar information while correlation goes beyond covariance and also gives us an idea about the **strength of the relationship**.

The following data shows the number of people with their corresponding temperature in a supermarket.

Temperature (°F) = 93, 84, 82, 78, 98, 70 (Variable x)
Number of People = 13, 10, 11, 8, 15, 9 (Variable y)

x_i	$x_i - \overline{x}$	y_i	$y_i - \overline{y}$	$(x_i - \overline{x})(y_i - \overline{y})$
93	8.8333	13	2	17.667
84	-0.1667	10	-1	0.167
82	-2.1667	11	0	0
78	-6.1667	8	-3	18.5

98	13.8333	15	4	55.333
70	-14.1667	9	-2	28.333

Putting temperature and number of people values in the formula we calculate the covariance:

$$Cov(x,y) = \frac{\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{n-1} = \frac{17.667+0.167+0+18.5+55.333+28.333}{6-1} = \frac{120}{5} = 24$$

The covariance between the temperature and the number of people is 24. Since the covariance is positive, the temperature and number of people have a positive relationship. As temperature rises, so does the number of people.

However there is no information about how strong the relationship is, and the answer to this problem is the correlation:

$$Correlation = \frac{Cov(x,y)}{s_x s_y} = \frac{24}{10.128 \times 2.608} = \frac{24}{26.409} = 0.909$$

The 0.909 which is called the correlation coefficient shows that there is a very strong and positive correlation between temperature and number of people.

Tips:

- Correlation is calculated by the division of covariance by the standard deviation of variables.
- While **covariance** values are ***not standardized***, **correlation** values are ***standardized***.
- In fact, nowadays no one does these manual calculations anymore. All calculations are made with a single line of code with a computer software.

Previous Next

Statistics Basics (DS-11)

Correlation and Covariance

To do: Go through the activity to the end

Let's Practice

Question
Correct
Mark 1.00 out of 1.00

Correlation or covariance is positive ✔ if one variable increases the other also increases and negative ✔ if one increases the other decreases.

Check

Your answer is correct.

You have correctly selected 2.

Correct

Marks for this submission: 1.00/1.00.

Previous Next

You have completed 50% of the lesson

50%

Jump to...

Reset user tour on this page

CLARUSWAY
WAY TO REINVENT YOURSELF

Statistics Basics (DS-11)

Correlation and Covariance

To do: Go through the activity to the end

Pearson Correlation Coefficient

There are different methods to calculate the correlation coefficient between two variables. The most famous one is the Pearson Correlation Coefficient. It is a number between -1 and 1 that indicates the strength of the relationship.

-1 : Indicates complete negative correlation

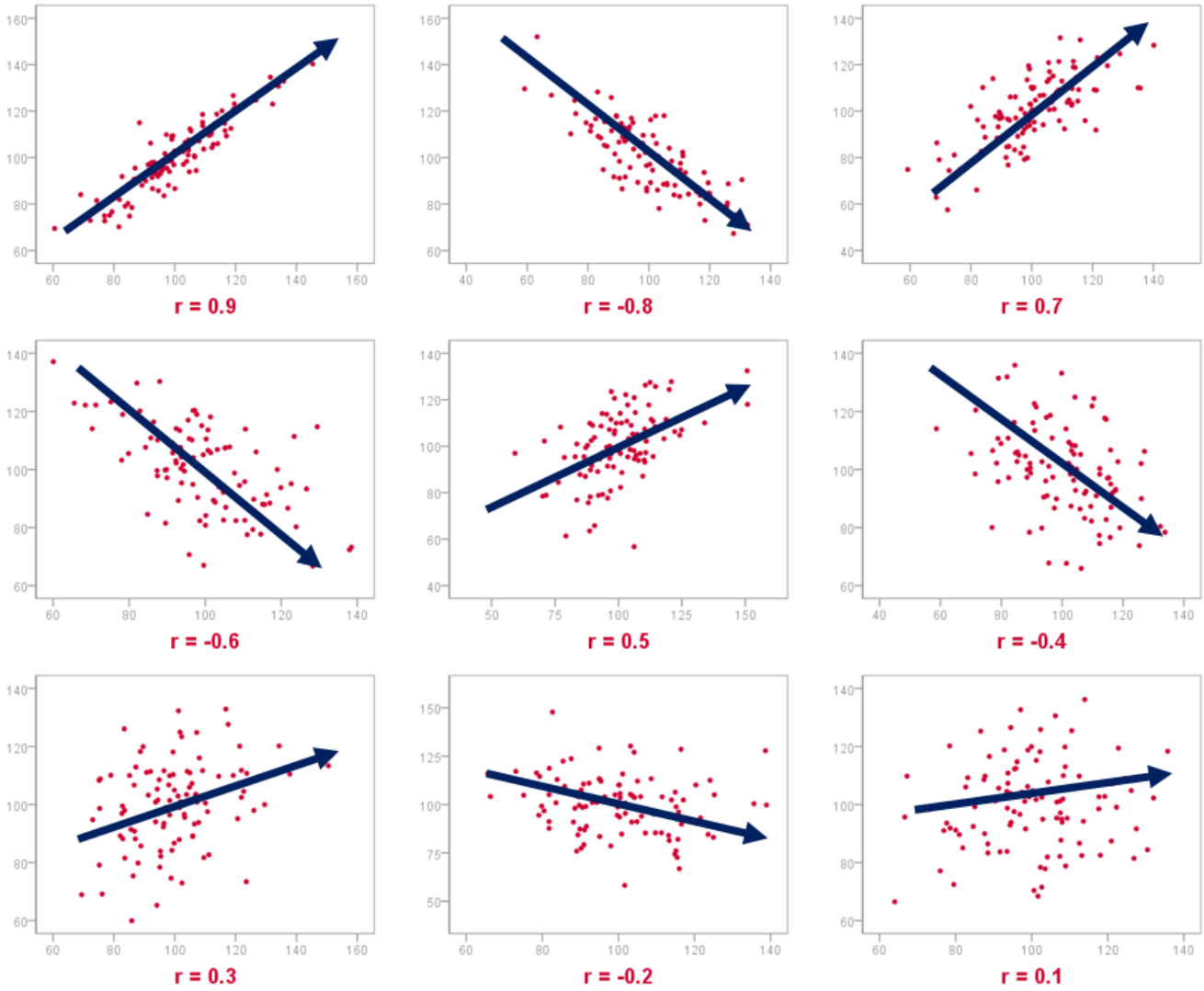
+1 : Indicates complete correlation

0 : Indicates no correlation

The Pearson correlation coefficient is calculated as follows:

$$r = \frac{\sum(x-\mu_x)(y-\mu_y)}{\sqrt{\sum(x-\mu_x)^2 \sum(y-\mu_y)^2}}$$

It captures not only the strength but also the direction of the linear association between two continuous variables. And it tries to draw a line of best fit through the data points of two variables. The picture below, in which the correlation coefficient is denoted by “r” illustrates this point very well. Blue arrows are the lines of best fit through the data points of two variables.



Tips:

- Pearson Correlation Coefficient tries to draw a line of best fit through the data points of two variables.
- Linear transformations have no effect on Pearson's correlation coefficient.
- Pearson's correlation is symmetric in the sense that the correlation of X with Y is the same as the correlation of Y with X.

Previous Next

Statistics Basics (DS-11)

Correlation and Covariance

To do: Go through the activity to the end

Let's Practice

Question
Correct
Mark 1.00 out of 1.00

0.9 indicates a very strong positive relationship.

Select one:

- True ✔
- False

Check

Congrats! You are right.

Correct

Marks for this submission: 1.00/1.00.

Question
Correct
Mark 1.00 out of 1.00

Which is higher, the correlation between temperature and humidity or the correlation between humidity and temperature?

Select one:

- humidity and temperature
- They are about the same.
- They are exactly the same. ✔ Congrats! You are right.
- temperature and humidity

Clear my choice

Check

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Statistics Basics (DS-11)

Correlation and Covariance

To do: Go through the activity to the end

Calculate Correlation and Covariance with Python

We can easily calculate covariance and correlation with numpy. The results of **np.cov()** and **np.corrcoef()** commands are displayed in matrix form. You remember the covariance between temperature and number of people was 24, and the correlation was 0,9. Try to find these values in the result matrices and ignore the other values. You can compare the values we get by numpy with the values we calculated manually.

input :

```
#with numpy library
import numpy as np

temp=[93,84,82,78,98,70]

number_of_people=[13,10, 11, 8, 15, 9]

print("covariance: ", np.cov(temp, number_of_people))

print("correlation: ", np.corrcoef(temp, number_of_people))

```

output :

```
covariance:  [[102.56666667  24.        ]
              [ 24.           6.8       ]]

correlation:  [[1.         0.90876934]
               [0.90876934 1.        ]]

```

input :

```
#with scipy library
from scipy import stats

print("correlation coefficient and p-value: ", stats.pearsonr(temp,
    number_of_people))

```

output :

```
correlation coefficient and p-value:  (0.9087693361896165, 0
    .012104893069677013)
```

Started on	Thursday, 21 April 2022, 12:49 PM
State	Finished
Completed on	Thursday, 21 April 2022, 12:50 PM
Time taken	56 secs
Marks	6.00/6.00
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 1.00 out of 1.00

r=-0.88. Describe the correlation.

Select one:

- weak negative
- weak positive
- strong negative ✔ Congrats! You are right.
- strong positive

Your answer is correct.

The correct answer is: strong negative

Question **2**

Correct

Mark 1.00 out of 1.00

r=0.28. Describe the correlation.

Select one:

- strong negative
- weak negative
- weak positive ✔ Congrats! You are right.
- strong positive

Your answer is correct.

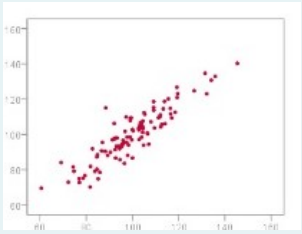
The correct answer is: weak positive

Question **3**

Correct

Mark 1.00 out of 1.00

Describe the correlation in the graph.



Select one:

- weak negative
- strong positive
- strong negative
- weak positive

✔ Congrats! You are right.

Your answer is correct.

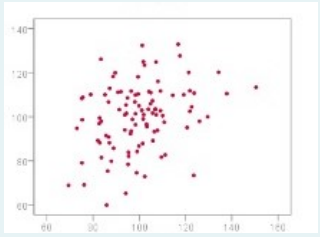
The correct answer is: strong positive

Question **4**

Correct

Mark 1.00 out of 1.00

Describe the correlation in the graph.



Select one:

- weak negative
- strong positive
- weak positive
- strong negative

✔ Congrats! You are right.

Your answer is correct.

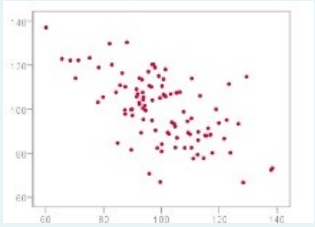
The correct answer is: weak positive

Question **5**

Correct

Mark 1.00 out of 1.00

Try to estimate the correlation coefficient.



Select one:

- 0.5
- -0.6 ✔ Congrats! You are right.
- 0.9
- -0.1

Your answer is correct.

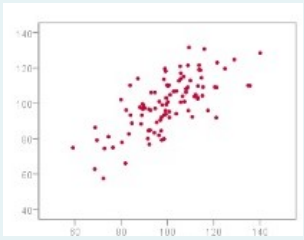
The correct answer is: -0.6

Question **6**

Correct

Mark 1.00 out of 1.00

Try to estimate the correlation coefficient.



Select one:

- 0.1
- 0.7 ✔ Congrats! You are right.
- -0.6
- -0.9

Your answer is correct.

The correct answer is: 0.7

◄ Complementary Lesson About Correlation

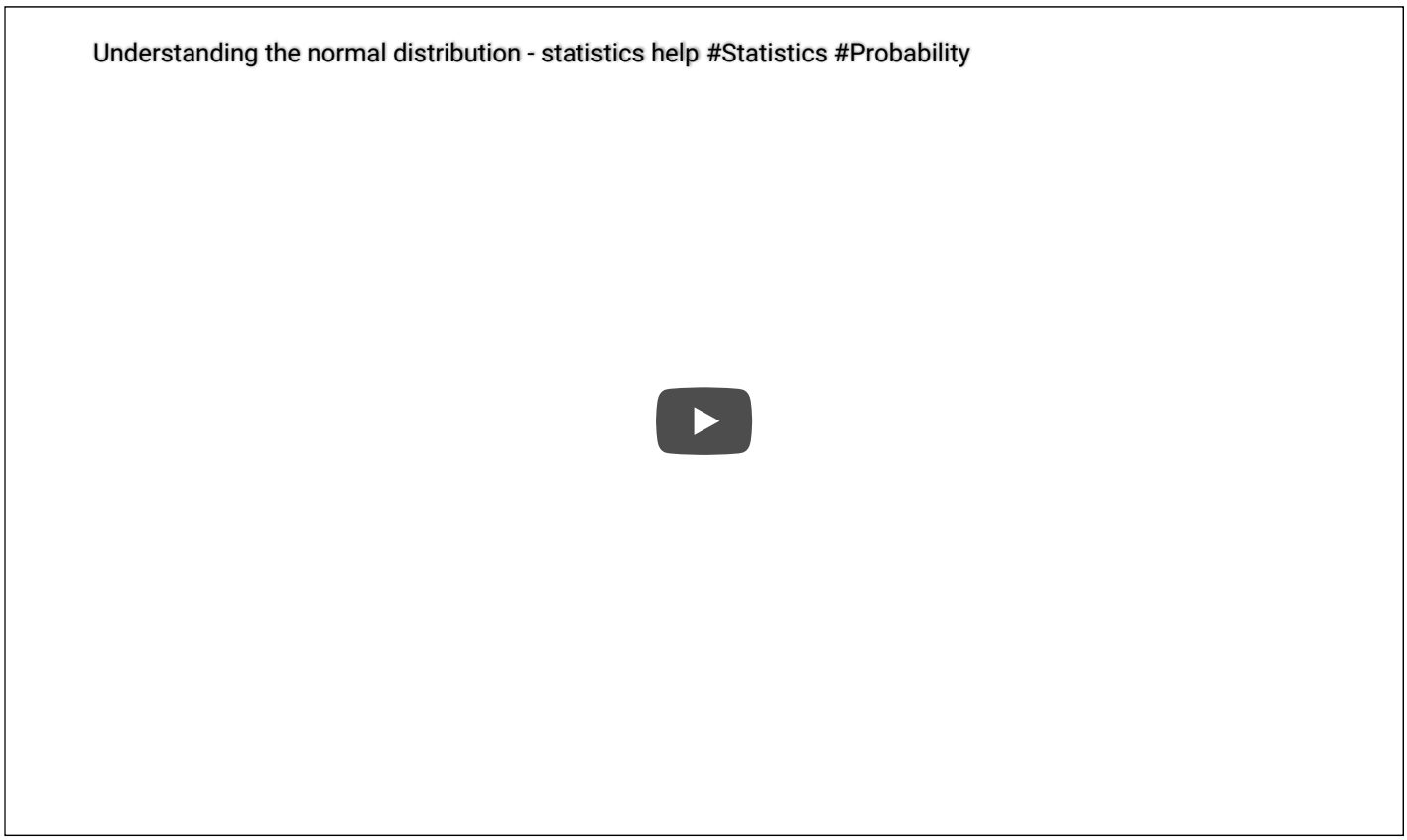
Jump to...

Statistics Basics (DS-11)

Normal Distribution

To do: Go through the activity to the end

Normal (Gaussian) Distribution



The normal distribution, also called the gaussian or bell curve, is a naturally occurring distribution in most cases. The normal distribution can be seen in tests like the GRE or SAT. Most students will get an average score (C), while fewer students will receive a B or D. An even smaller number of students score an F or an A. That generates a distribution that resembles a bell that is why the normal distribution is also called the bell curve. The form of the normal distribution is symmetrical. Half of the data will fall to the right of the mean and the other half will fall to the left. Most of the data follow this type of pattern. The normal distribution is therefore commonly used in industry, statistics and public bodies.

For example;
- Weights of people,
- Blood pressures,
- Scores on a test,
- IQ scores,
- Wages,

follow the normal distribution pattern.

Statistics Basics (DS-11)

Normal Distribution

To do: Go through the activity to the end

Lets Practice

Question
Correct
Mark 1.00 out of 1.00

IQ scores in the world follow the normal distribution pattern.

Select one:

- (•) True ✔
- ( ) False

Check

Congrats! You are right.

Correct

Marks for this submission: 1.00/1.00.

Previous Next

You have completed 11% of the lesson

11%

Jump to...

Statistics Basics (DS-11)

Normal Distribution

To do: Go through the activity to the end

Properties of a Normal Distributions

The normal distribution has its characteristics. The most important of these are listed below.

- Normal distributions are symmetric around their mean.
- The mean, median, and mode of a normal distribution are equal.
- The total area under the normal curve is equal to 1.0.
- Normal distributions are described by two parameters, the mean (μ) and the standard deviation (σ).

Previous Next

You have completed 22% of the lesson

22%

Jump to...

Statistics Basics (DS-11)

Normal Distribution

To do: Go through the activity to the end

Lets Practice

Question
Correct
Mark 1.00 out of 1.00

What are the properties of a normal distribution?

Select one:

- (●) All ✔ Congrats! You are right.
- ( ) The total area under the normal curve is equal to 1.0.
- ( ) Normal distributions are described by two parameters, the mean (μ) and the standard deviation (σ).
- ( ) Mean and median are the same
- ( ) It's symmetrical

Clear my choice

Check

Your answer is correct.

Correct

Marks for this submission: 1.00/1.00.

Previous Next

You have completed 33% of the lesson

33%

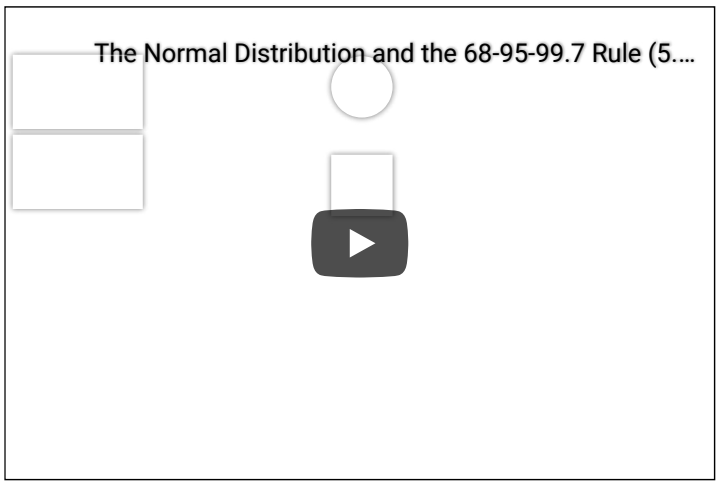
Jump to...

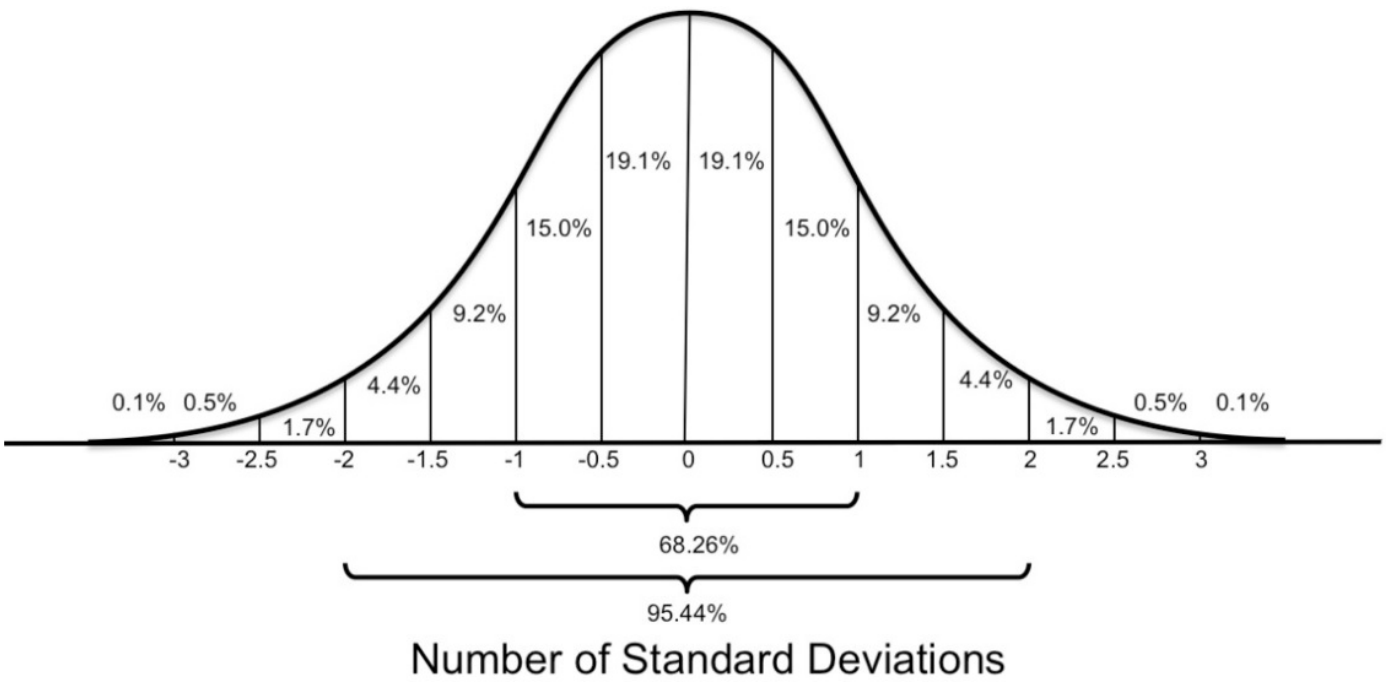
Statistics Basics (DS-11)

Normal Distribution

To do: Go through the activity to the end

The Area Under the Normal Distributions Curve





We are abovementioned about that that the total area under the normal curve is equal to 1.0. By using the two parameters we can split the area under the normal distribution curve. In other words, the area under the normal distribution curve tells us what percentage of the data falls within a certain number of standard deviations from the mean:

- Approximately 68% of the area of a normal distribution is within one standard deviation of the mean,
- Approximately 95% of the area of a normal distribution is within two standard deviations of the mean,
- Approximately 99,7% of the area of a normal distribution is within three standard deviations of the mean.

Previous Next

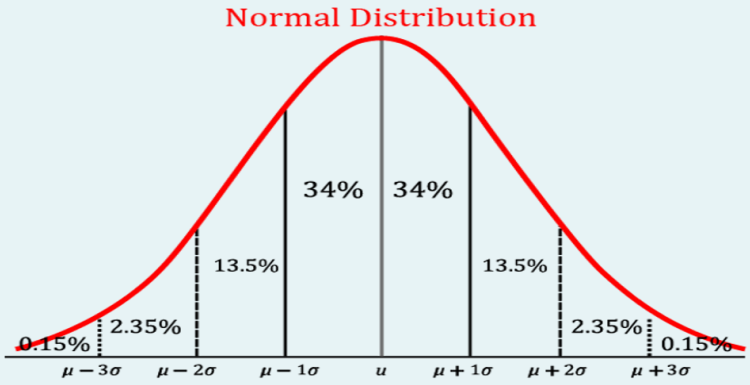
Statistics Basics (DS-11)

Normal Distribution

To do: Go through the activity to the end

Lets Practice

Question
Correct
Mark 1.00 out of 1.00



At a local high school, GPA's are normally distributed with a mean of 3 and standard deviation of 0.5. What percentage of students at the high school have a GPA between 2.5 and 3.5? (Please use 68-95-99.7 rule)

Select one:

- 97%
- 99.7%
- 95%
- 68% ✔ Congrats! You are right.

Clear my choice

Check

Your answer is correct.

Correct

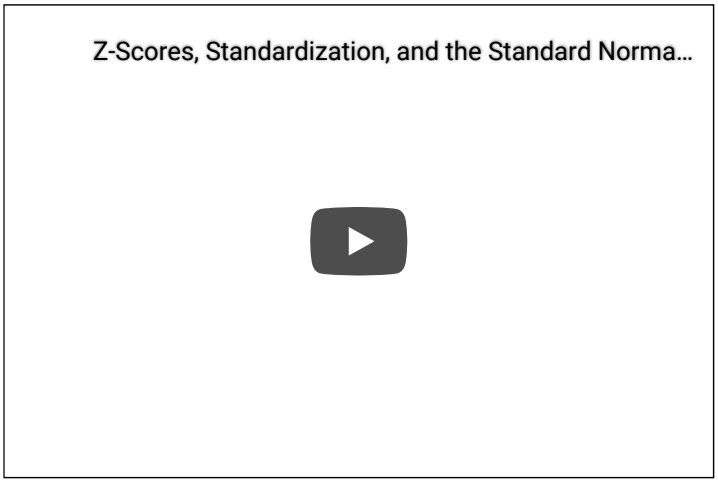
Marks for this submission: 1.00/1.00.

Statistics Basics (DS-11)

Normal Distribution

To do: Go through the activity to the end

Z-Score



We calculate the probability of an outcome by determining the area under the normal distribution curve. However, sometimes we need to find the probability of an outcome that does not fall directly within 1, 2, or even 3 standard deviations from the mean.

We use the z score to standardize the normal distribution curve. Instead of mean in the normal distribution curve we insert the zero. Similar to the standard deviations to the left and right of the mean, we insert 1,2,3 and -1,-2,-3 to the left and right of the zero. The z scores represent the standard score. Therefore, a z-score of 1, is one standard deviation above the mean, and a z-score of -1, is one standard deviation below the mean.

Rather than creating a normal distribution curve for each dataset, we can use one standard normal distribution curve by z-score and use the formulas to find probabilities.

The basic z score formula for a z-score is:

$$z = \frac{x - \mu}{\sigma}$$

For example, let's say you have a test score of 205. The test has a mean (μ) of 180 and a standard deviation (σ) of 20. Assuming a normal distribution, your z score would be:

$$z = \frac{205 - 180}{20}$$

$$z = \frac{25}{20}$$

$$z = 1,25$$

The z score tells you how many standard deviations from the mean your score is. In this example, your score is 1,25 standard deviations above the mean.

Previous Next

Statistics Basics (DS-11)

Normal Distribution

To do: Go through the activity to the end

Lets Practice

Question
Correct
Mark 1.00 out of 1.00

We use the z score to standardize ✔ the normal distribution curve. Instead of mean in the normal distribution curve we insert the zero ✔ .

Check

Your answer is correct.

You have correctly selected 2.

Correct

Marks for this submission: 1.00/1.00.

Previous Next

You have completed 78% of the lesson

78%

Jump to...

Statistics Basics (DS-11)

Normal Distribution

To do: Go through the activity to the end

Z Table

The z-table helps us to make a probability calculation by the z-score. The table provides us with accurate proportion values for all z scores within -3.9 and +3.9 standard deviations from the mean. Therefore, we can find the probability for any dataset that is normally distributed by using the z-sore in the z-table. When using a z table, you should keep in mind that the values provided in the table represent the probability at or below the indicated z score. Therefore, if you wish to find the probability of an outcome occurring after, or to the right, of the z-score you will need to use the fact that the total area under the normal curve is equal to 1.0 and subtract to find the desired probability. We calculated the z-score as 1,25 for the previous example. By using this value in the z-table we can find the probability of getting a score of 205 or less. The z score tells you how many standard deviations from the mean your score is. In this example, your score is 1,25 standard deviations above the mean. (1.2+0.05=1.25)

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817

We divide the z-score into two parts as 1,2 and 0,05 (1,2+0,05=1,25). We use the value of 1,2 on the left side of the table, and use the value of 0,05 on the top of the table. So we reach the probability of 0,8944 at the intersection point. That value means, % 89,44 of the students receive a score of 205 or less, where the test has a mean (μ) of 180 and a standard deviation (σ) of 20. Because the total area under the normal curve is equal to 1, we can say also that the probability of getting a score of greater than 205 is % 10,56.

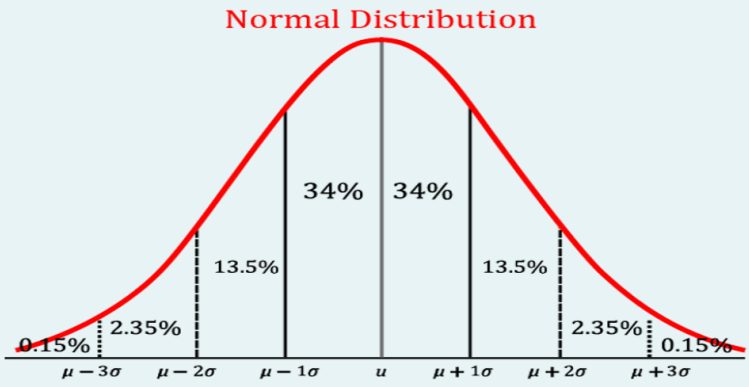
Previous Next

Started on	Thursday, 21 April 2022, 1:41 PM
State	Finished
Completed on	Thursday, 21 April 2022, 1:53 PM
Time taken	11 mins 8 secs
Marks	5.00/6.00
Grade	**8.33** out of 10.00 (**83**%)

Question **1**

Correct

Mark 1.00 out of 1.00



About what percent of the values lie within one standard deviation of the mean in a normal distribution?

Select one:

- 97%
- 99.7%
- 95%
- 68%

✔ Congrats! You are right.

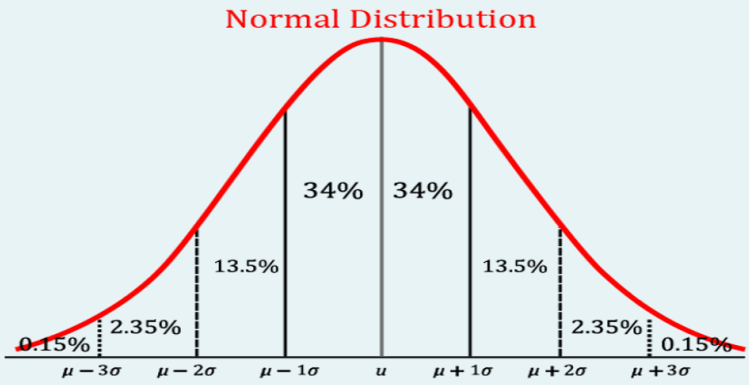
Your answer is correct.

The correct answer is: 68%

Question **2**

Correct

Mark 1.00 out of 1.00



About what percent of the values lie within two standard deviations of the mean in a normal distribution?

Select one:

- 95%
- 97%
- 68%
- 99.7%

✔ Congrats! You are right.

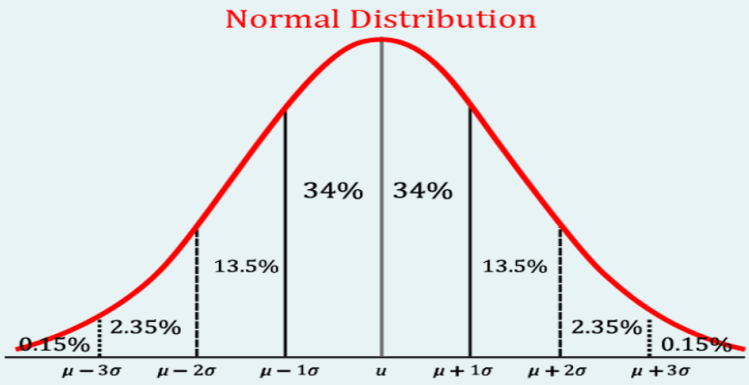
Your answer is correct.

The correct answer is: 95%

Question **3**

Correct

Mark 1.00 out of 1.00



At a local high school, GPA's are normally distributed with a mean of 3 and standard deviation of 0.5. What percentage of students at the high school have a GPA between 2.5 and 3.5? (Please use 68-95-99.7 rule)

Select one:

- 97%
- 99.7%
- 95%
- 68%

✔ Congrats! You are right.

Your answer is correct.

The correct answer is: 68%

Question **4**

Correct

Mark 1.00 out of 1.00

A random variable X has a normal distribution, with a mean of 20 and a standard deviation of 2.

What is the z-score for a value of 23?

Select one:

- -1.5
- 1.5

✔ Congrats! You are right.

- -1
- 1

Your answer is correct.

The correct answer is: 1.5

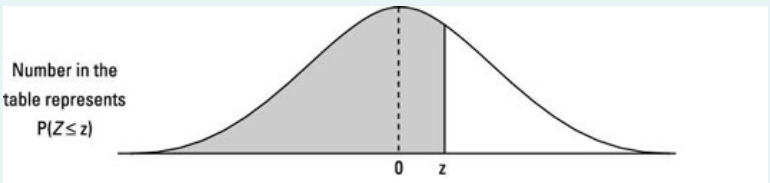
Question **5**

Correct

Mark 1.00 out of 1.00

Example: To find P(Z ≤ 1.5), using the Z-table below, we find where the row for 1.5 intersects with the column for 0.00; this value is 0.9332. The Z-table shows only "less than" probabilities so P(Z ≤ 1.5)=0.9332.

What is P(Z ≤ 2)?



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.5	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998
3.6	.9998	.9998	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999

Select one:

- 0.9990
- 0.8413
- 0.5793
- 0.9772

✔ Congrats! You are right.

Your answer is correct.

The correct answer is: 0.9772

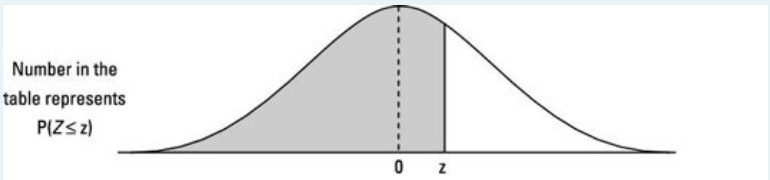
Question **6**

Incorrect

Mark 0.00 out of 1.00

Your son is attending a primary school and his IQ score is 130. At the school, the mean IQ level is 100 and the standard deviation is 15. What is the probability that a randomly chosen child will have a higher IQ score than your son?

(Hint: Because the Z-table gives you only "less than" probabilities, you might need to subtract P(Z < z) from 1)



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
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1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
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1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
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1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.5	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998
3.6	.9998	.9998	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999

Select one:

- %2.28
- %20.12
- %3
- %5.75

✖ Not correct, keep trying.

Your answer is incorrect.

The correct answer is: %2.28