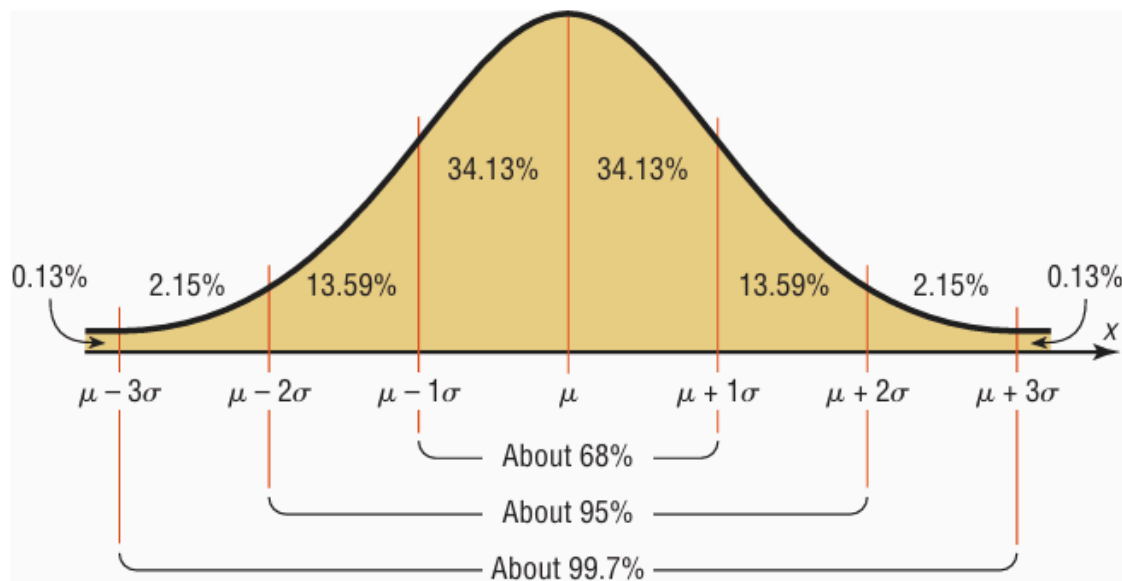## ⌄ Normal Distributions

If a random variable has a probability distribution whose graph is continuous, bell-shaped, and symmetric, it is called a **normal distribution**. The graph is called a normal distribution curve.

1. All the central tendencies (mean, median and mode) are equal and at center.
2. There is only one mode i.e. unimodal.
3. The curve is same on both side of the mean i.e. symmetric.
4. The curve never touches the x-axis. However, it gets close but never touches.
5. In normal distribution, one standard deviation of the mean covers approximately 68%, two standard deviation covers 95% and three standard deviation of the mean covers the area of 99.7%.

**Negatively or Left-Skewed Distribution:** When the majority of the values falls right of the mean

Positively or Right-Skewed Distribution: When the majority of the values falls left of the mean

Standard Normal Distribution: Normal distribution when mean is 0 and standard deviation is 1.

For example:
Find the area under the standard normal distribution curve to the left of z = 2.09.
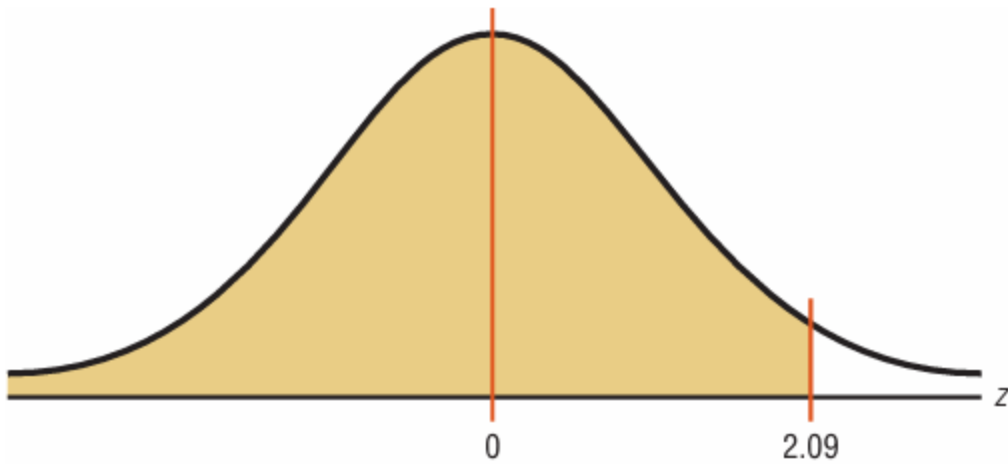
Here, the z is the standard deviation from the mean which is 0. From above the value is positive and is between 2 and 3, so the area should between 95% and 99.7%.

We can calculate the area using z-table. To ease, Python has inbuilt function.

```python
# importing the library
import scipy.stats as stats

# given the information
z = 2.09

area = stats.norm.cdf(z)

print(f"The area under the standard normal curve to the left of z = {z} is {area*100:.2f
```

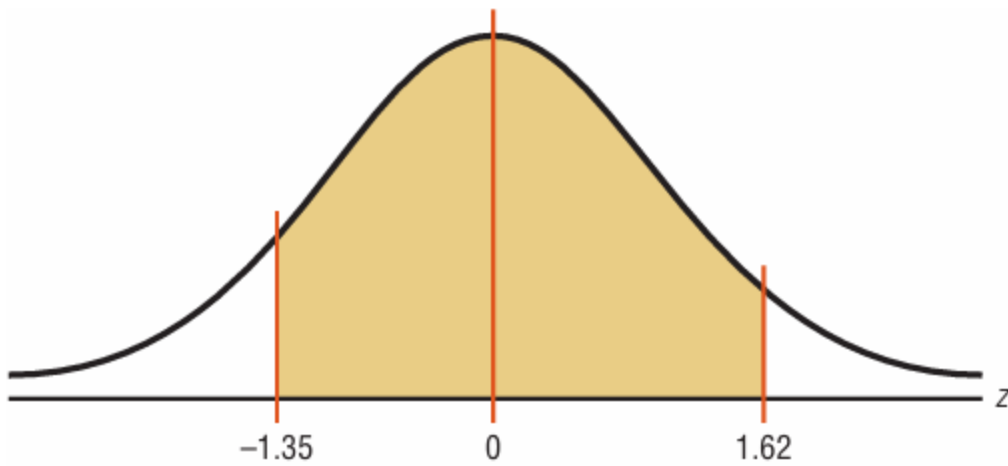⇥ The area under the standard normal curve to the left of z = 2.09 is 98.17%

˅ Question 1

Find the area under the standard normal distribution curve to the right of z = -1.14.

```python
## Write Your Code Here ##
```

Example:
Find the area under the standard normal distribution curve between z = 1.62 and z = -1.35.

```
 1 # importing library
 2 import scipy.stats as stats
 3
 4 z1 = 1.62
 5 z2 = -1.35
 6
 7 areaz1 = stats.norm.cdf(z1)
 8 areaz2 = stats.norm.cdf(z2)
 9
10 actual_area = areaz1 - areaz2
11
12 print(f"The area under the standard normal distribution curve between z = {z1} and z = {
```

→ The area under the standard normal distribution curve between z = 1.62 and z = -1.35 is

◄ ⬤⬤⬤⬤⬤⬤⬤⬤⬤⬤⬤⬤⬤⬤⬤⬤⬤⬤ ►

⌄ Question 2

Find the area under the standard normal distribution curve between z = 2.0 and z = -2.0.

```
1 ## Write Your Code Here ##
```