In [7]:
```
# import the libraries
import pandas as pd
import numpy as np
import scipy as sci
import matplotlib.pyplot as plt
import scipy.stats as stat
import math
```

In [9]:
```
# Given
μ =100     # population mean of Blood glucose levels for obese patients
σ= 15      # standard deviation of Blood glucose levels for obese patients (population)
N = 36     # No of Samples who have tried the raw cornstarch diet
```

In [17]:
```
print('\nCalculate Z Score Using Formula: (X - μ) / (σ/math.sqrt(N)')
Z = (X - μ) / (σ/math.sqrt(N))
print('\t Z-Score value is :',Z)


print('\nProbability of having mean less than 108:\n\t\t p = stats.norm.cdf(Z)')
p = stat.norm.cdf(Z) # cdf function takes Z- score , returns standard normal probality
print('\t i.e.\t p =',round(p,4))

print('\nThe probability of having mean more than 108:',round(1-p,4))
print('i.e. The probability of having mean more than 108 is lesser than Significance l

print('\nSo, We can reject the Null Hypothesis')
```

```
Calculate Z Score Using Formula: (X - μ) / (σ/math.sqrt(N)
         Z-Score value is : 0.35406698564593303

Probability of having mean less than 108:
                 p = stats.norm.cdf(Z)
         i.e.    p = 0.6384

The probability of having mean more than 108: 0.3616
i.e. The probability of having mean more than 108 is lesser than Significance leve
l 0.05

So, We can reject the Null Hypothesis
i.e. Raw cornstarch diet does not have an affect
```

In [12]:
```
# Given
p_state1_republican =52/100    # Republican voters in the first state 52%
p_state1_democract = 48/100    # Democrats voters in the first state 48%
n_state1 = 100                 # No. of samples from first state=100

p_state2_republican =47/100    # Republican voters in the second state 47%
p_state2_democract = 53/100    # Democrats voters in the second state 53%
```

In [14]:
```
# Calculate probability that the survey will show a greater percentage of
# Republican voters in the second state than in the first state

# Standard deviation
σ=  math.sqrt(((p_state1_republican*(1- p_state1_republican))/n_state1) + \
              ((p_state2_republican*(1- p_state2_republican))/n_state2))

print('Standard deviation:\t',  round(σ,5))

# Mean Difference
mean_difference = p_state2_republican  - p_state1_republican
print('Mean Difference:\t',  round(mean_difference,5))

# Z Score
# Z = (mean difference/Std Deviation)

Z = mean_difference/σ
print('Z Score:\t\t',  round(Z,5))

print('\nProbability of having greater Republican voters in the second state:\n\t\t p
p = stat.norm.cdf(Z) # cdf function takes Z- score , returns standard normal probality
print('\t i.e.\t p =',round(p,4))

print('\ni.e. The probability that the survey will show a greater percentage of Republ
```

```
Standard deviation:      0.07062
Mean Difference:         -0.05
Z Score:                 -0.70803

Probability of having greater Republican voters in the second state:
                 p = stats.norm.cdf(Z)
         i.e.    p = 0.2395

i.e. The probability that the survey will show a greater percentage of Republican
voters
         in the second state than in the first state is 0.2395
```

In [15]:
```
# Given
X = 1100      # My SAT Score. i.e. Sample value of SAT score
σ = 209       # Standard deviation of SAT score
μ = 1026      # Mean SAT score
```

In [18]:
```
print('\nZ Score Using Formula: (X - μ) / σ/math.sqrt(N)')
Z = (X - μ) / (σ/math.sqrt(N))
print('\t Z-Score value is :', Z)

print('\nProbability of having my score more than averge:\n\t\t p = stats.norm.cdf(Z)'
p = stat.norm.cdf(Z) # cdf function takes Z- score , returns standard normal probality
print('\t i.e.\t p =',round(p,4))
```

```
Z Score Using Formula: (X - μ) / σ/math.sqrt(N)
         Z-Score value is : 0.35406698564593303

Probability of having my score more than averge:
                 p = stats.norm.cdf(Z)
         i.e.    p = 0.6384

i.e. Probability of having my score more than avearge:  63.84 %
```