Importing necessary modules

```
In [27]:  1  from scipy.stats import norm
          2  import statistics as st
          3  import numpy as np
          4  import matplotlib.pyplot as plt
```

Task1: Real estate survey analysis

A) To write hypothesis and type of tail test

Ho(Null Hypothesis)- The average price per sqft is 33.88dollars in 2020 μ=33.88.

H1(Alternate Hypothesis)- To prove it is not 33.88 (Both tail test) μ<33.88 & μ>33.88.

B) To calculate z-critical

alpha = 0.05

Standard deviation = 1.28

Mean=32.18

```
In [28]:  1  S=1.28
          2  n_1=49
          3  pop_m=33.88
          4  mean_x=32.18
          5  alpha=0.05
          6  z_critical=norm.ppf(1-alpha/2)
```

C) What are the test statistics for hypothesis test?

```
In [29]:  1  z_statistics=(mean_x-pop_m)/(S/(n_1)**0.5)
          2  p_value=norm.sf(abs(z_statistics))*2
          3  print("The p value is : ",p_value)
          4  print("The z_critical for alpha 0.05 is = ",z_critical)
          5  print("The z_statistics value is = ",abs(z_statistics))
```

```
The p value is :  1.4463410868771357e-20
The z_critical for alpha 0.05 is =  1.959963984540054
The z_statistics value is =  9.296875000000016
```

Conclusion from above stats

Two rules to reject null hypothesis:

1) To see if p_value < alpha which is True

2) To see if Z_statistics> Z_critical or less than Z_critical which is also True the Null hypothesis is proved to be false and can be Rejected

Business decision taken :

To reject null hypothesis which means in 2020 the average price of houses is not 33.88 sqft

Also accepting the alternate hypothesis where the average price of houses is less or greater than 33.88 sqft

Therefore its observable that there could be a surge or a crash in the market of real estate in the U.S

Task 2: Sports metrics analysis

```
In [30]:  1  mean_p=85
          2  S=2.1
          3  n_s=32
          4  mean_s=87.5
          5  a=0.05
```

A)To identify hypothesis

1) Ho(Null Hypothesis)- The javelin thrower's average throw is 85 yards

2) H1(Alternate Hypothesis)- The new grip helped mac throw him 87.5 yards in 32 trials

$\mu \leq 87.5$ right tail test

```
In [31]:    1  z_critical=norm.ppf(1-alpha)
            2  print("The z_critical for alpha 0.05 is = ",z_critical)
            3  z_statistics=(mean_s-mean_p)/(S/(n_s)**0.5)
            4  print("The test statistics for hypothesis = ",z_statistics)
            5  p_value=norm.sf(z_statistics)
            6  print("The p value = ",p_value)
            7
            8  lower=mean_s-7*S
            9  upper=mean_s+5*S
           10  normp=np.arange(lower,upper)
           11  plt.plot(normp,norm.pdf(normp,mean_p,S))
           12  plt.xlabel("Yards")
           13  plt.title('Normal probability distribution')
           14
           15  plt.show()
```

```
The z_critical for alpha 0.05 is =  1.6448536269514722
The test statistics for hypothesis =  6.734350297014738
The p value =  8.233201952582752e-12
```
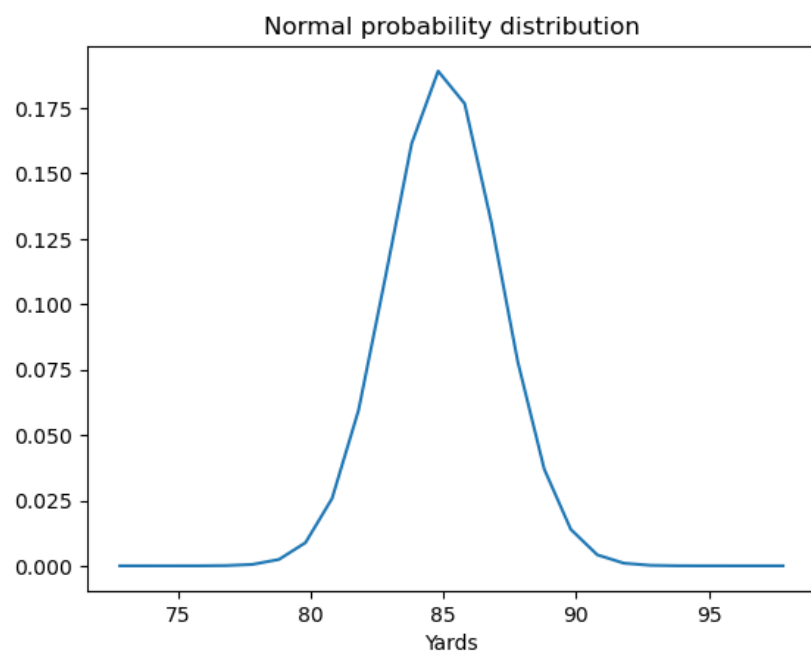

Conclusion :

Two rules to reject null hypothesis:

1) To see if p_value < alpha which is True

2) z_statistics=6.73435> z_critical=0.25459, which leads to rejection of Null Hypothesis.

p_value=8.23320e-12 < alpha=0.05, which leads to rejection of Null Hypothesis.

so we reject the null hypothesis Ho=The average throw of javelin with different grip is <=85.

we can conclude that alternate hypothesis is accepted in this condition which is Ha=The average throw of javalin with different grip is >85,So the average distance after changing the grip is increased.