

Q3. Auditors at a small community bank randomly sample 100 withdrawal transactions made during the week at an ATM machine located near the bank's main branch. Over the past 2 years, the average withdrawal amount has been 50 with a standard deviation of 40. Since audit investigations are typically expensive, the auditors decide to not initiate further investigations if the mean transaction amount of the sample is between 45 and 55. What is the probability that in any given week, there will be an investigation?

A. 1.25% B. 2.5% C. 10.55% D. 21.1% E. 50%

In [1]:

```
# Import Necessary Libraries

from scipy import stats
from scipy.stats import norm
```

n=100, Pop Mean=50, Pop SD=40 As no. of samples is more than 30, we can consider it normal distribution

In [2]:

```
# For No investigation P(45<X<55)
# For Investigation 1-P(45<X<55)
```

In [3]:

```
# find z-scores at x=45; z=(s_mean-P_mean)/(p_SD/sqrt(n))
z=(45-50)/(40/100**0.5)
z
```

Out[3]:

-1.25

In [4]:

```
# find z-scores at x=55; z=(s_mean-P_mean)/(p_SD/sqrt(n))
z=(55-50)/(40/100**0.5)
z
```

Out[4]:

1.25

In [18]:

```
# For No investigation P(45<X<55) using z_scores = P(X<55)-P(X<45)
(stats.norm.cdf(1.25)-stats.norm.cdf(-1.25)).round(4)
```

Out[18]:

0.7887

In [6]:

```
stats.norm.interval(0.7887,loc=50,scale=40/(100**0.5))
```

Out[6]:

```
(45.00000495667348, 54.99999504332652)
```

In [19]:

```
# For Investigation 1-P(45<X<55)
prob = 1-0.7887
print("The probability that in any given week, there will be an investigation is ",prob*100
```

```
The probability that in any given week, there will be an investigation is 2
1.1300000000000003 %
```