Ans -1

There are two outcomes we found in this situation that is-

1-Satisfactory

2-Not Satisfactory

So, P(S) Denotes the probability for Satisfactory Result and P(N) Denotes the Not Satisfactory Result.

As Satisfactory result more likely 4 times than not satisfactory result , it means

$4P(S)+1P(N)=1$

So, probability of total Satisfactory Result is:

$P(S)=4/5$

And probability for total Not Satisfactory result is:

$P(N)=1/5$

For Probability that at most 3 drugs are not able to do a satisfactory job will be <=3

So, we need to calculate probabilities for x=0,1,2 and 3.

Probability For not satisfactory drugs:

$P=1/5=0.2$

$(1-P)=4/5=0.8$

Formula:

$P(X=r)={}^{n}C_{r}\ (P)^{r}\ (1-P)^{n-r}$

$P(X=0) = {}^{10}C_{0}\ (P)^{0}\ (1-P)^{10-0}$

$=1*(0.2)^{0} * (0.8)^{10}$

$=0.1073$

$P(X=1) = {}^{10}C_{1}\ (P)^{1}\ (1-P)^{10-1}$

$=10*(0.2)^{1} * (0.8)^{9}$

$=10* 0.2* 0.13421$

$=0.2684$

$P(X=2) = {}^{10}C_2\ (P)^2\ (1\text{-}P)^{10-2}$

$=45*(0.2)^2 * (0.8)^8$

$=45 * 0.04 * 0.1677$

$=0.30198$

$P(X=3) = {}^{10}C_3\ (P)^3\ (1\text{-}P)^{10-3}$

$=120*(0.2)^3 * (0.8)^7$

$=120 * 0.008 * 0.2097$

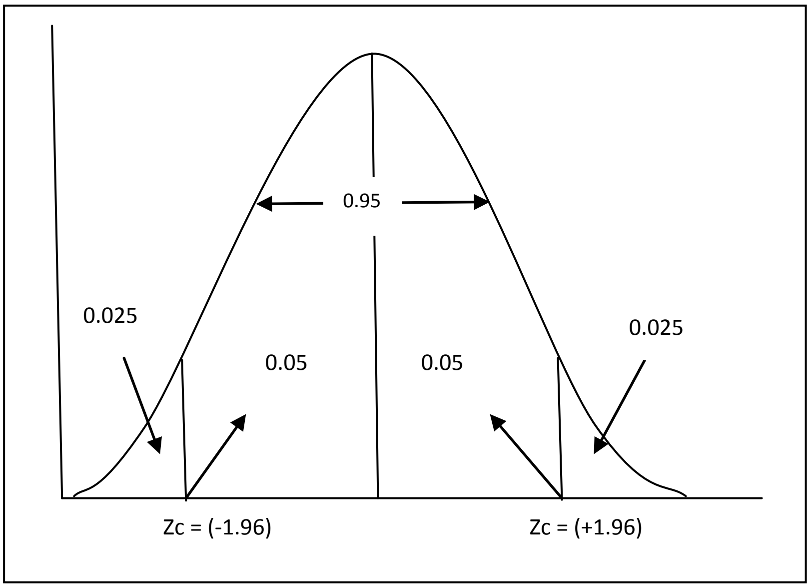
$=0.2013$

So Total Probability= ${}^{10}C_0+{}^{10}C_1+{}^{10}C_2+{}^{10}C_3$

=0.1073+0.2684+0.30198+0.2013

=0.8790

Ans-2



Here,

μ (Population Mean) =207, n=100, S=65

for 95% Confidence level z=± 1.96

Confidence Interval= μ ± (z * S)/ √n

=207 ± (1.96 * 65)/ √100

$=207 \pm 127.4/10$

$=207 \pm 12.74$

UCV = 207+12.74 = 219.74

LCV = 207 – 12.74 = 194.26

Ans -3 (a)

Here,

$\mu = 200$, $\alpha=5\% = 0.05$

Null Hypothesis H_0: $\mu<=200$

Alternate Hypothesis H_1 : $\mu>200$

$Z=1- \alpha =1-0.05=0.95$

From z-table we can't found exact value for 0.95 so we take average of two columns that is - (0.04 and 0.05)

So, $z = 1.645$

Standard Error $\sigma_{x(bar)} = \sigma/\sqrt{n} = 65/\sqrt{100} = 65/10 = 6.5$

$UCV= \mu+ z * \sigma_{x(bar)}$

$= 200 + 1.645 * 6.5$

$= 200 + 10.6925$

$= 210.6925$

Here UCV > X (bar) So, The Sample Mean lies in Acceptance Region.

So we Fail to Reject Null Hypothesis

<u>Ans -3 (b)</u>

In First Sample α= 0.05 and β=0.45

So, Total Error = $\alpha + \beta$ = 0.05 + 0.45 = **0.50**

In Second Sample α= 0.15 and β=0.15

So, Total Error = $\alpha + \beta$ = 0.15 + 0.15 = **0.30**

Here, Alpha1 < Alpha2 (0.05<0.15)

In Both Samples α have lowest value in First Sample and as we know lower α value used to lower the probability of making a wrong decision (Type I Error). The Probability of Type I Error is called significance Level (α). Type I errors are generally considered more serious than Type II Error. So, we take First Sample.

<u>Example 1:</u>

There are Two Water Purifier sample for test. if the first Purifier gives more 'False Positive' or Type I Error, Informing Water is not Pure when It is Pure.

On the other hand , the Second Purifier gives more 'False Negative' result informing Water is Pure when it is not Pure.

If for First Purifier α=0.05 then result promises 95% of accuracy rate. This means that in 5% of cases, or 5 in every 1000 sample ,the test gives a 'False Positive' result.

If for Second Purifier α=0.15 then result promises 85% of accuracy rate. This means that in 15% of cases, or 15 in every 1000 sample ,the test gives a 'False Positive' result.

Water Purity is directly related to Health of Customers. We can't take Type I Error risk. So, we go for lower alpha value with low Type I Error (False Positive or Null Hypothesis)

<u>Example 2:</u>

There are two Washing Powder sample, first is expensive and second is less expensive. First Powder sample test gives 'False Positive' result informing its Harmful for Clothes when it is not.

On the other hand, the Second Powder gives more 'False Negative' result informing

Washing Powder is not Harmful for Clothes when it is actually harmful.

If for First Powder α=0.05 then result promises 95% of accuracy rate. This means that in 5% of cases, or 5 in every 1000 sample, the test gives a 'False Positive' result.

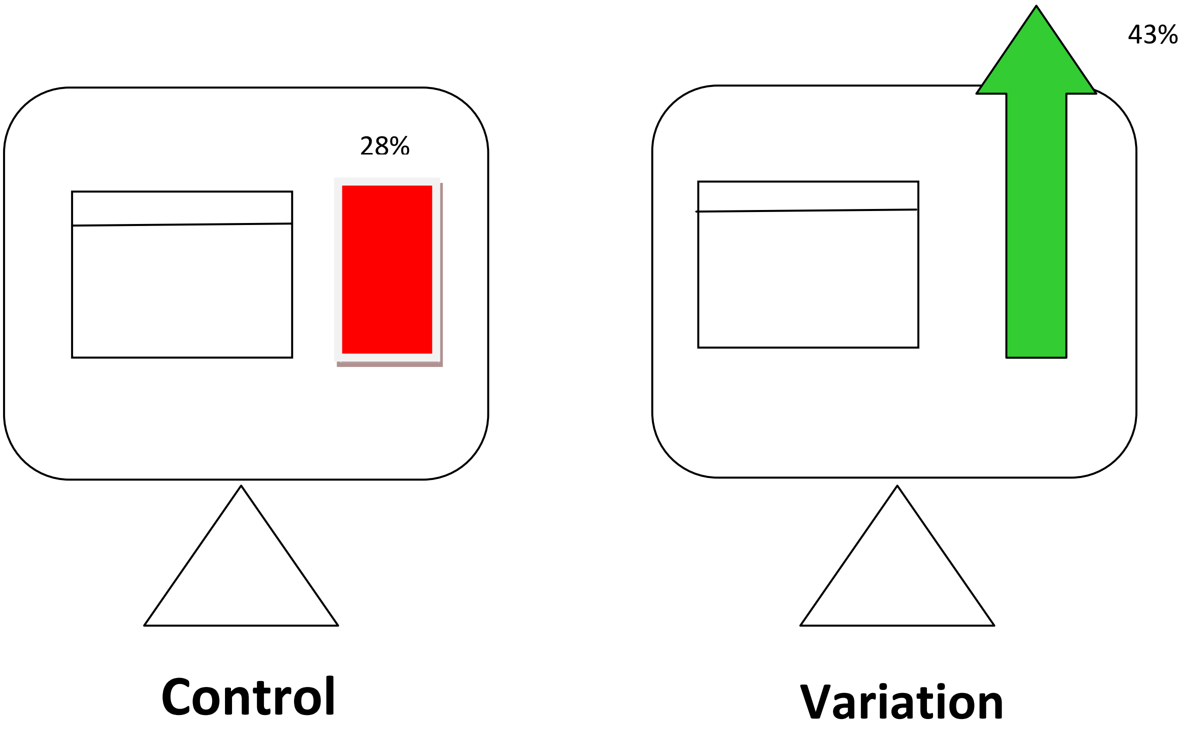
If for Second Powder α=0.15 then result promises 85% of accuracy rate. This means that in 15% of cases, or 15 in every 1000 sample, the test gives a 'False Positive' result.

We can take Type I Error risk and suggest for higher alpha value (Type II Error). so that customer go for having washing powder with less price money.

Ans- 4

A/B Testing for Company:

For A/B Testing we need to create two or more variations of webpage with different taglines. Here we have two taglines from the marketing company. So we can create two online webpage variations –



For website Optimization we need to go for these steps-

1. **Collect Data-** We can begin optimization with high traffic areas of company website, as that will allow you to gather data faster. We have to look for pages with low conversion rates or high drop-off rates that can be improved.
2. **Determine Conversion to improve-** we can select two webpage variations with both taglines for improving conversion.

3. **Hypothesis Change-** create two Hypothesis web pages with Separate Tagline Provided on each webpage
4. **Identify the variable & create variations-** We can create variation on Home page where customer interacts first. Tagline can be displayed as a slogan on top most of page.
5. **Run Experiment-** Run both variations with two separate teams . suppose we have 100 people in team. Divide 50-50 in two teams. First Team interact with ‘A’ variation and Second Team interacts with ‘B’ variation.
6. **Measure Results-** We can analyse success and failure of variation after running experiment with number of people. Suppose we got 43% increment in results in one of both variations. We can suggest that variation to choose for company website on basis of statistical analysis of relevant growth in clicks.