



TEST OF HYPOTHESIS
B.COM. PART I

HYPOTHESIS TEST (SINGLE MEAN)

Q#1:

The Tiny Tots Company is considering to buying a new symbolic YO-YO String from a manufacturer who claims that the string has a mean breaking strength of 15 Pounds with a standard deviation of 0.5 pound. Test the hypothesis that $\mu = 15$ pounds against the alternative that $\mu \neq 15$ pounds if a random sample of 50 string is tested and found to have a mean breaking strength of 14.8 pounds. Use a 0.01 level of significance.

Q#2:

A random sample of 100 recorded deaths in the United States during the past year showed an average life span of 71.8 years, with a standard deviation of 8.9 years. Does this seem that the average life span today is greater than 70 years? Use 0.05 level of significance.

Q#3:

The average length of time for students to register for fall classes at Slippery Ice College has been 50 minutes, with a standard deviation of 20 minutes. A new registration procedure-using modern computing machines is being tried. If a random sample of 12 students had an average registration time of 42 minutes with a standard deviation of 11.9 minutes under the new system, test the hypothesis that the population mean is now less than 50 minutes. Use a level of significance (A) 0.05 and (B) 0.01.

Q#4:

A random sample of 36 drinks from a soft-drink machine at the Long Branch Hotel has an average content of 7.4 ounces and a standard deviation of 0.48 ounce. Test the hypothesis that $\mu = 7.5$ ounce against the alternative hypothesis that $\mu > 7.5$ ounces at the 0.05 level of significance.

Q#5:

A random sample of size 20 from a normal distribution is a mean 32.8 and a standard deviation $S = 4.51$. Does this suggest, at the 0.05 level of significance that the population mean is greater than 30?

Q#6:

An electric firm supplies light bulbs to Tiny Tot Toy Co. for use in their popcorn peppers that have a length of life that approximately normally distributed with a mean of 800 hours and a standard deviation of 40 hours. Test the hypothesis that $\mu = 800$ hours against the alternative that $\mu \neq 800$ if a random sample of 30 bulbs has an average life of 788 hours. Use a 0.04 level of significance.

Q#7:

Test the hypothesis that the average weight of Boxes of chewing food is 10 ounces if the weight of a random sample of 10 boxes are 10.2, 9.7, 10.1, 10.3, 10.1, 9.8, 9.9, 10.4, 10.3 and 9.8 ounces. Use a 0.1 level of significance and assuming the distribution of weight to be approximately normal.

Q#8:

Last year the employees of the Watergate carpet Company donated an average of \$ 8.00 to the American Cancer Society. Test the hypothesis at the 0.01 level of significance that the average Contribution this year is still \$ 8.00 if a random sample of 12 employees showed an average donation of \$ 8.90 with a standard deviation of 1.75. Assume that the donations are approximately normally distributed.

Q#9:

A random sample of 8 Wheeze Cigarettes has average nicotine content of 18.6 milligrams and a standard deviation of 2.4 milligrams. Is this in line with the manufacturer's claims that the average nicotine content does not exceed 17.5 milligrams? Use a 0.01 level of significance and assume the distribution of nicotine content to be normal.

Q#10:

A machine has been producing rods cut off at 10.50 width. A random sample of 10 items shows a mean of 10.82 inch. Is the machine out-of-control? Test the hypothesis at 0.01 level of significance.

Q#11:

A research study examined the consumption expenditure of a random sample of 68 average class Pakistani families. The sample means are Rs. 1052 and a standard deviation was Rs. 250. Test the hypothesis that $\mu = \text{Rs. } 950$ against the alternative that $\mu > \text{Rs. } 950$ at the (i) 0.05 and (ii) 0.01 level of significance.

Q#12:

A random sample of size 36 is taken from a population with a known variance $\sigma^2 = 25$. If the mean of the sample is 42.6 test the null hypothesis that $\mu = 45$ against the alternative hypothesis $\mu < 45$ with $\alpha = 0.05$

Q#13:

A research worker is interested in testing a fertilizer affect on the wheat production, which has average production of 40 mounds per acre $\sigma^2 = 25$ mounds. He selected at random 16 acres of land, which were similar in all respect the seeds were sown, and fertilizers were provided. The yield of 16 plots was observed to be 40, 44, 43, 41, 40, 41, 44, 42, 41, 42, 43, 46, 40, 38, 44, 43. Test the hypothesis that production will be increased due to fertilizer's use/effect. Use a 0.05 level of significance.

Q#14:

A random sample of 25 values given the average of 83. Can this sample be regarded as drawn from the normal population with mean 80 and $S = 7$. Test the hypothesis $\mu = 80$ against the alternative $\mu > 80$ at the

- (i) 0.05 and (ii) 0.01 level of significance.

Q#15:

A random sample of Size 34 is taken from a normal population with a known variance $S^2 = 22$. If the mean of the sample is 41.73, test the null hypothesis that $\mu = 43$ against the hypothesis $\mu < 43$ with $\alpha = 0.05$.

HYPOTHESIS TEST (DOUBLE MEAN)

Q#1:

A random sample of $n_1 = 25$, taken from a normal population with a standard deviation $\sigma_1 = 5.2$, has a mean $X_1 = 81$. A second random sample of size $n_2 = 36$, taken from a different normal population with a standard deviation $\sigma_2 = 3.4$, has a mean $X_2 = 76$. Test the hypothesis at the 0.06 level of significance that $\mu_1 = \mu_2$ against the alternative that $\mu_1 \neq \mu_2$.

Q#2:

A farmer claims that the average yield of corn of variety A exceeds the average yield of variety B by at least 12 bushels per acre. To test this claim 50 acres of each variety are planted and grown under similar conditions. Variety A yielded, on the average, 86.4 bushels per acre with a standard deviation of 6.28 bushels per acre. While variety B yielded on the average, 77.8 bushels per acre with a standard deviation of 5.61 bushels per acre. Test the farmer's claim using 0.05 level of significance.

Q#3:

A standard chemistry test was given to the 50 girls and 75 boys in a university. The girls made an average grade of 76 with a standard deviation of 6, while the boys made an average grade of 82 with a standard deviation of 8. Test the hypothesis that girls and boys perform equally well on the standardization test. Use a 0.05 level of significance.

Q#4:

A random sample of 80 light bulbs supplied to the Tiny Tot Toy Company for use in their popcorn machine by company A had an average lifetime of 1258 hours with a standard deviation of 94 hours, while a random sample of 60 light bulbs supplied by company B had an average life time of 1029 hours with a standard deviation of 68 hours. Because of high cost of bulbs from company A the Tiny Tot Toy Company is considering to buy from company B unless the bulbs from company A will last over 2500 hours longer on the average then those from company B. Run a test, using $\alpha = 0.01$ to determine from whom they should buy there bulb.

Q#5:

At Hidden Valley High school a course in Mathematics was taught to 12 students by the conventional class room procedure. A second group of 10 students was given the same course by means of programmed material. At the end of semester the same examination was given of each group. The 12 students in the class room made an average grade of 85 with a standard deviation of 4, while the students who used programmed materials, made an average grade of 81, with a standard deviation of 5. Test the hypothesis that the two methods of learning are equal. Use a 0.01 level of significance, with equal variance.

Q#6:

A taxi company is trying to decide whether to purchase Brand A or B tries for its fleet of taxies. To help arrive at a decision an experiment is conducted using 12 of each brand. The tries are run until they wear out, the results are:

Brand A X_1	23600 miles	$S_1 = 3200$ miles
Brand B X_2	24800 miles	$S_2 = 3700$ miles

Test the hypothesis at the 0.05 level of significance that there is no difference in the two brands of tries. Assume the population to be approximately equally normally distributed.

Q#7:

A study was made to estimate the difference on salaries of college professors in the private and state colleges of Virginia. A random sample of professors in private colleges showed an average 9-month salary of \$ 16000 with standard deviation of \$ 1300. A random sample of 200 professors in state colleges showed an average salary of 16900 with standard deviation of 1400

Test the hypothesis that the average salary of professors teaching in state colleges does not exceed the average salary of professors in private colleges by more than \$ 500. Use a 0.02 level of significance.

Q#8:

The following data represented the running time of films produced by two different motion picture company:

Time in minutes

Company I :	102,	86,	98,	109,	92.		
Company II:	81,	165,	97,	134,	92,	87,	114.

Test the hypothesis that the average running time of films produces by the company II exceeds the average running time of films produced by the company 1 to 10 minutes. Use a 0.1 level of significance and assume the distribution of times to be approximately normally distributed with equal variances.

Q#9:

A sample of 100 cables was taken from company A and average breaking strength was found to be 1980 pounds with a standard deviation of 180 pounds while another sample of 125 cables was taken from another company and the average breaking strength was found to be 1950 pounds with a standard deviation of 150 pounds. Test the hypothesis of no difference between the average breaking strength of the two kinds of cables. Use $\alpha = 0.05$.

Q#10:

In a study that compared average times taken by men and women to do a certain job. A random sample of 13 men and 13 women at a large industrial complex was taken and the following results were obtained:

MEN:	$X = 42$ minutes, $S = 7$ minutes,
WOMEN:	$X = 30$ minutes, $S = 5$ minutes.

Can you conclude at a 0.01 level of significance that women do this job on the average 10 minutes earlier then men? Assume the population to be approximately normally distributed with equal variance.