Tutorial 6

1. Find student's t, for the following variate value in a sample of eight -4,-2,2,0,2,2,3,3 taking the mean of the universe to be zero.

2. Ten students are selected at random in a university and their heights are measured in inches as 64,65,65,67,67,69,69,70,72 and 72. Using these data, Discuss the suggestion that the mean height of the students in the university is 66. (At 5% level of significance the value of t for 9 d.f is 2.262).

3. A fertilizer mixing machine is set to give 12kg of nitrate for every quintal bag of fertilizer. Ten 100kg bags are examined. The percentages of nitrate are as follows 11,14,13,12,13,12,13,14,11,12. Is there reason to believe that the machines is defective? (Value of t for 9 d.f is 2.262). Justify?

4. Two random samples drawn from two normal populations are given below. Test whether the two populations have the same variances

Sample I	20	16	26	27	23	22	18	24	25	19		
Sample II	17	23	32	25	22	24	28	6	31	20	33	27

5. In two groups of ten children each increase in weight due to two different diets in the same period were in pounds.

Group I	8	5	7	8	3	2	7	6	5	7
Group II	3	7	5	6	5	4	4	5	3	6

Find whether the variance is significantly different.

6. The nicotine contents in milligrams in two samples of tobacco were found to be as follows.

Group I	24	27	26	12	25	
Group II	27	30	28	31	22	36

Can it be said that the two samples have same variance. Justify?

7. An automatic bottling machine fills oil into 2-liter (2,000 cm^3) bottles. A consumer advocate wants to test the null hypothesis that the average amount filled by the machine into a bottle is at least 2,000 cm^3. A random sample of 40 bottles coming out of the machine was selected and the exact contents of the selected bottles are recorded. The sample mean was 1,999.6 cm^3. The population standard deviation is known from past experience to be 1.30 cm^3. Test the null hypothesis at an α of 5%.

8. An automobile manufacturer substitutes a different engine in cars that were known to have an average miles-per-gallon rating of 31.5 on the highway. The manufacturer wants to test whether the new engine changes the miles-per-gallon rating of the automobile model. A random sample of 100 trial runs gives $\bar{X}$ = 29.8 miles per gallon and S = 6.6 miles per gallon. Using the 0.05 level of significance, is the average miles-per-gallon rating on the highway for cars using the new engine different from the rating for cars using the old engine?

9. Sixteen oil tins are taken at random from an automatic filling machine. The mean weight of the tins is 14.2 kg, with a standard deviation of 0.40 kg. Can we conclude that the filling machine is wasting oil by filling more than the intended weight of 14 kg, at a significance level of 5%?

10. The makers of Duracell batteries want to demonstrate that their size AA battery lasts on an average of at least 45 minutes longer than Duracell's main competitor, the Energizer. Two independent random samples of 100 batteries of each kind are selected. The sample average lives for Duracell and Energizer batteries are found to be $\bar{X}_1 = 308$ minutes and $\bar{X}_2 = 254$ minutes respectively. Assume $\sigma_1 = 84$ minutes and $\sigma_2 = 67$ minutes. Is there evidence to substantiate Duracell's claim that its batteries last, on an average, at least 45 minutes longer than Energizer of the same size?