Assignment - XI

(Small Sampling Theory)

Deadline: 8/11/19

1. Construct t-distribution and χ2-distribution by sampling (with replacement) from the wing lengths of house flies for sample sizes: (a) 1400 samples of k = 5, and (b) 200 samples of k = 35. Compare these two distributions with the sampling distribution of means (computed earlier for the two sample sizes). Submit all the three plots.
2. A sample of 12 measurements of the breaking strengths of cotton threads gave a mean of 7.38 grams and a standard deviation of 1.24 grams. Find 95% confidence limits for the actual breaking strength.
3. The mean lifetime of electric light bulbs produced by a company has in the past been 1120h with the standard deviation of 125h. A sample of eight electric light bulbs recently chosen from a supply of newly produced bulbs showed a mean lifetime of 1070h. Test the hypothesis that mean lifetime of the bulbs has not changed, at significance levels of 0.01.
4. The standard deviation of the lifetimes of 10 electric light bulbs manufactured by a company is 120h. Find the 99% confidence limits for the standard deviation of all bulbs manufactured by the company.
5. The standard deviation of the breaking strengths of certain cables produced by a company is given as 240lb. After a change was introduced in the process of manufacture of these cables, the breaking strengths of a sample of eight cables showed a standard deviation of 300lb. Investigate the significance of the apparent increase in variability at significance level of 0.01.
6. Two samples of sizes 10 and 15 are drawn from two normally distributed populations having variances 40 and 60, respectively. If the sample variances are 90 and 50, determine whether the sample 1 variance is significantly greater than the sample 2 variance at 0.05 significance level.
7. Three coins were tossed a total of 240 times, and each time the number of heads turning up was observed. The results are shown in the table below, together with the results expected under the hypothesis that the coins are fair. Test this hypothesis at a significance level of 0.05.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 0 Heads | 1 Head | 2 Heads | 3 Heads |
| Observed frequency | 24 | 108 | 95 | 23 |
| Expected frequency | 30 | 90 | 90 | 30 |

1. Determine the goodness of fit of the data in the table given below. Is the fit “too good”. Use the 0.05 significance level.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *X* | 0 | 1 | 2 | 3 | 4 |
| *f* | 30 | 62 | 46 | 10 | 2 |