Stat355, F 2016, SAMPLE Questions

1. The mean weight of luggage checked by 5 randomly selected economy class passenger flying between two cities in a certain airline (airline A) were 32, 36, 45, 33, and 38 lbs respectively. The same for 5 randomly selected economy class passengers on another airline (airline B) flying between the two cities were 33, 31, 28, 39, 38 lbs, respectively. Assume normality for the luggage weight distribution.

   (a) Provide a 90% CI for the mean luggage weight checked in by a randomly selected economy class passenger for airline A. Interpret the CI.

   (b) What should be the sample size for the width of the confidence interval to be less than 1lb?

   (c) Provide a 90% prediction interval for the weight of the luggage of the next passenger in airline B.

   (d) Provide a 90% lower CI for the variability of luggage weight for passengers in airline B.

   (e) Suppose you are testing that the mean luggage weight for airline A is 35 against the alternative that it is more than 35. what should be the sample size so that the power of a 5% level of significance test at an alternative value of 38 is 90%. Assume true standard deviation to be 2 lbs.

   (f) Test the hypothesis that the variance in luggage weight distribution are same for both airlines.

   (g) Test the hypothesis that mean luggage weights for economy class passengers are same for the two airlines against the alternative that it is higher for airline A. Use type I error rate 10%. State all your assumptions clearly.

   (h) Provide a 95% CI for the difference in mean luggage weights for airlines A and B.

   (i) Suppose in another sample of 64 economy class passengers in airline A, the mean luggage weight exceeded 40 lbs for 12 passengers. Test the hypothesis that the proportion of airline A economy passengers with luggage weight greater than 40 lbs is 0.2 against the alternative that it is less than 0.2.

2. The level of a particular air toxin was measured both outdoor and indoor for a sample of different localities. Suppose the measurements over 3 localities 0.65, 0.62, 0.43 for indoors and 0.72, 0.61, 0.55 for outdoors, respectively. Test the hypothesis that the toxin level is same outdoor and indoor versus the alternative that it is higher outdoors. Assume normality and type I error rate of 1%.

3. Suppose the number of times a component will fail in a given number of operating hours, say T hours, is distributed according to a Poisson distribution with mean failure rate of μ failures per T hours of operation. A random sample of 36 different T-hour durations provided a mean number of failures per T-hour as 5.2 with a standard deviation of 2.2. Test the hypothesis that μ is 4.5 against the alternative that it is more than 4.5. Use Type I error rate of 5%.

4. Six brands of chocolate were tested for acidity. The sample sizes, mean acidity levels and sample standard deviations were (4, 0.36, .1), (3, 0.33, 0.13), (9, 0.31, 0.21), (2, 0.4,0.2),(5, 0.33, 0.09) and (4, 0.38, 0.17), respectively. State the ANOVA hypothesis and its alternative clearly and test it at 5% level of significance.