ENR211 STATISTICS FOR ENGINEERS

Problem Set 2

Hypothesis Testing

1. The _____ hypothesis says that the difference is due to chance, but _____ hypothesis says that the difference is real. Fill in the blanks. Options: null, alternative.

2. One hundred draws are made at random with replacement from a box. The average of the draws is 22.7, and the SD is 10. Someone claims that the average of the box equals 20. Is this plausible?

3. An investigator draws 250 tickets at random with replacement from a box. What is the chance that the average of the draws will be more than 2 SEs above the average of the box?

4. A 70g weight is placed on a weighing machine and the readings turn out to be *72, 79, 65, 84, 67, 77.* Is the machine properly calibrated? Or do the measurements show bias?

5. True or false, and explain: to make a t -test with 4 measurements, use Student's curve with 4 degrees of freedom.

6. Several thousand measurements on a checkweight average out to 512 micrograms above a kilogram; the SD is 50 micrograms. Then, the weight is cleaned. The next 100 measurements average out to 508 micrograms above one kilogram; the SD is 52 micrograms. Apparently, the weight got 4 micrograms lighter. Or is this chance variation? (You may assume the Gauss model with no bias.)

   (a) Formulate the null and alternative hypotheses as statements about a box model.

   (b) Would you estimate the SD of the box as 50 or 52 micrograms?

   (c) Would you make a z-test or a t-test?

   (d) Did the weight get lighter? If so, by how much?

7. A die is rolled 60 times and table shows the data. Is the die loaded? Perform a Chi-Square Test.

4	3	3	1	2	3	4	6	5	6
2	4	1	3	3	5	3	4	3	4
3	3	4	5	4	5	6	4	5	1
6	4	4	2	3	3	2	4	4	5
6	3	6	2	4	6	4	6	3	2
5	4	6	3	3	3	5	3	1	4