

Bus 274: Further Statistics for Business

Spring 2010

PROBLEM SHEET # 7

Problem 1: A dishwasher detergent has been renamed. The question is: Has the new name had any effect on sales figures? We have sales data (the number of packages sold) from 10 shops for two months, one before and one after the product was renamed. (That is, we have 20 observations, two for each shop.)

- a) Introduce suitable random variables.
- b) Which hypothesis would you test?
- c) Which test statistic would you use?
- d) Suppose your null hypothesis in (b) is not rejected. What would you do as the brand manager of this dishwasher detergent?

Problem 2: An inventor has developed a new, energy-efficient generator engine. He claims that the engine will run continuously for 5 hours (300 minutes) with a single fuel tank (3 liters). Suppose a random sample of 25 engines is taken. The engines run for an average of 307 minutes, with a sample standard deviation of 25 minutes. The inventor claims that mean run time is at least 300 minutes. (Assume that run times for the population of engines are normally distributed.)

- a) State the appropriate null hypothesis (H_0) and the appropriate alternative (H_1) to confirm the inventor's point. (Hint: Use a one-sided hypothesis.)
- b) Choose an appropriate test statistic T . Plug in all relevant values given in this problem. If you have formulated T correctly, your calculation will give 1.4.
- c) Using a 5% level of significance, carry out the test. (Hint: Find the critical region first, using the appropriate distribution table.)
- d) What would be the result of your test if you used a significance level of 10%?
- e) Now suppose your shop sells these generators. Do you think it is ethical to advertise the generators as "At least 300 minutes run time!"? Give reasons for your answer.