**CBA: Practice Problem Set 6**

**Topics: Hypothesis testing**

1. For each of the following statements, indicate whether it is True/False. If false, explain why.

The average purchase amount at a retailer’s online site is $80. The retailer is evaluating a new design for its website that, it hopes, would encourage shoppers to spend more. Let *μ* represent the average amount spent per customer at its redesigned website.

1. The appropriate null hypothesis for testing the profitability of the new designis *H*0: *μ*≤ 80.
2. If the *p*-value of the test is less than α, then we will always commit a Type II error.
3. If the *p*-value of the test is less than α, then we will always commit a Type I error.
4. For each of the following statements, indicate whether it is True/False. If false, explain why.

An accounting firm is considering offering investment advice in addition to its current focus on tax planning. Its analysis of the costs and benefits of adding this service indicates that it will be profitable if 40% or more of its current customer base use it. The firm plans to survey its customers. Let *π*denote the proportion of its customers who will use this service if offered and let *p* denote the percentage who say they will use this service in the survey. The firm plans to run a test with the following hypotheses, H0: *π*≤0.4; HA: *π*>0.4 and *α*= 5%.

1. If the *H*0is true, then any sample will have a *p* less than 0.40.
2. The *p*-value of the test of the null hypothesis in this example is the probability that the investment service will be profitable.
3. A pharmaceutical company is testing a newly developed therapy. If the therapy lowers the blood pressure of patients by more than 10 mm on average, it is deemed effective. What are the natural hypotheses to test in a clinical study of this new therapy?
4. The management of a hotel chain avoids intervening in the local management of its franchises unless problems become far too many to ignore. It uses a measure of satisfaction to assess the performance at the hotels, and believes that solving problems is better left to the local staff unless this measure drops below 33% amongst all the franchise guests. A survey of 80 guests who recently stayed in the franchise in St Louis found that only 20% of the guests were satisfied. Should management intervene in the franchise in St. Louis?
5. State the null and alternative hypotheses.
6. Describe Type I and Type II errors in this context.
7. Find the p-value of the test. Do the data reject the null hypothesis if α=0.05?
8. Banks frequently compete by adding special services that distinguish them from rivals. These services can be expensive to provide. A bank hopes to retain customers that keep high balances in accounts with low interest rates. Typical customers at this bank keep an average balance of $3,500 in savings accounts that pay 2% interest annually. The bank loans this money to other customers at an average rate of 6%, thereby earning a 4% profit on these balances. A random sample of 65 customers was offered a special “personalized” account. After 3 months, the average balance in the 2% savings accounts for these customers was $5,000 (*s* = $3,000). The personalized service costs the bank $50 extra per customer per year over the costs of a normal savings account. Is this personalized account offering going to be more profitable than the normal savings account?
9. State the null and alternative hypotheses. Describe the parameters.
10. Describe Type I and Type II errors in this context.
11. Find the *p*-value of the test. Do the data reject the null hypothesis at α= 0.05. (Assume that the data meet the sample size condition.)