

Practice Problem-3 (Challenge)

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?

- ▶ State the null and alternative hypotheses. Describe the parameters.
- ▶ Find the p-value of the test. Do the data reject the null hypothesis at $\alpha = 0.05$. (Assume that the data meet the sample size condition.)

Practice Problem-3: Solution

- ▶ Suppose μ denotes the average increase in interest profit on a savings account when offered this personalized service (4% of the average balance in the account). The cost of this service is \$50. So, $H_0 : \mu \leq 50$ (personalized service is not profitable) and $H_A : \mu > 50$ (personalized service is profitable).
- ▶ The average increase in the balances is \$1500, earning an additional $0.04 \times \$1500 = \60 profit. The SD of this gain is $0.04 \times \$3000 = \120 . The test statistic is $t = \frac{60 - 50}{120/\sqrt{65}} = 0.6719$ with 64 degrees of freedom. The p-value is larger than 0.05. (Will use R to show how to calculate p-values). Hence we do not reject H_0 since the p-value is larger than α . Therefore, although the sample indicates that there might be an improvement in the profitability, there is not enough evidence to indicate that this improvement that the sample shows is a feature of the population and is not due to sampling variation alone.