10.2B Hypothesis Testing Using A P-Value Approach

The approach used previously is referred to as a "Classical Approach" to hypothesis testing. A second approach is call the P-Value Approach. A P-Value represents the probability of observing a sample statistic (like p-hat or x-bar) as extreme or more extreme than the one observed under the assumption that the null hypothesis is true. The smaller the P-Value, the less likely it is that H_0 is true.

Once a P-Value is calculated, a decision can be made according to the following:

- If $P < \alpha$, then reject H_0
- If $P \geq \alpha$, then do not reject H_0

To find the P-Value for a 2-tailed test, first determine whether the test statistic is positive or negative.

- If the test statistic (Z or T)is negative determine the area under the normal curve to the left of Z or T then multiply by 2.
- If the test statistic (Z or T)is positive determine the area under the normal curve to the right of Z or T then multiply by 2.

Example 1: Americans were asked, "What do you think is more important – to protect the right of Americans to own guns or to control gun ownership?" 46% of all Americans said protecting the right to own guns is more important. The Pew Research Center surveyed 1267 randomly selected Americans with at least a bachelor's degree and found that 559 believed that protecting the right to own guns is more important. Does this result suggest the proportion of Americans with at least a bachelor's degree feel differently than the general American population when it comes to gun control? Use the α=0.1 level of significance.

Example 2: Pepcid is a drug that can be used to heal duodenal ulcers. Suppose the manufacturer of Pepcid claims that more than 80% of patients are healed after taking 40 mg of Pepcid every night for 8-weeks. In clinical trials, 148 out of a simple random sample of 178 patients suffering from this type of ulcer were healed using the suggested treatment previously stated. Test the manufacturer's claim at the α=0.01 level of significance.