Example 1:
A certain automobile manufacturer claims that at least 80% of its cars meet the tough new standards of the Environmental Protection Agency (EPA). Let $p$ denote the proportion of the cars that meet the new EPA standards. The EPA tests a random sample of 400 cars from this manufacturer. Suppose that 308 of the 400 cars in our sample meet the new EPA standards. Perform an appropriate test at a 10% significance level.

Step 0: Check if the test is appropriate

Step 1: State the hypotheses

$H_0: \quad \text{vs.} \quad H_1: $

Other options:

$H_0: \quad \text{vs.} \quad H_1: $

$H_0: \quad \text{vs.} \quad H_1: $

Step 2: Compute the test statistic

Step 3: Compute the $p$-value

Step 4: State the conclusion

$p$-value \leq \alpha: \text{Reject } H_0$

$p$-value > $\alpha: \text{Fail to reject } H_0$

Since $p$-value =
Example 2:
Alex wants to test whether a coin is fair or not. Suppose he observes 477 heads in 900 tosses.
a) Perform the appropriate test using a 5% level of significance.

b) If the coin is actually loaded, did we make a mistake? If yes, what type of error did we make?