2024 Spring – SPC&O HW#6

1. Use the thickness data of **center zone** provided in 24Spring-HW#4.xls to
   a) construct and test the hypothesis H_0 (null hypothesis): $\mu_{left}=350$ and H_1: $\mu_{left}<350$ with $\alpha=0.1$. p-value?
   b) construct and test the hypothesis H_0 (null hypothesis): $\mu_{right}=350$ and H_1: $\mu_{right}\neq350$ with $\alpha=0.1$. p-value?
   c) Based on (a) and (b), do you think the thickness means of the right and left positions of the center zone are the same with a 90% confidence level?

2. Let $X_1, X_2,..., X_n$ be independent random sample observations from a Bernoulli distribution with the success probability equal to p. It is known that the summation of X_i (ΣX_i) will follow a Binomial distribution with the parameters (n, p). To test whether p of the Bernoulli distribution equals to p_0, ΣX_i is used as a test statistic.
   (a) Construct a two-tailed test with H_1: $p\neq p_0$ and set the critical value with the Type I error probability α.

   (b) Use the Super Lotto 638 data collected in 24Spring-HW#1 and assume that a number's appearance as the winning number of the first set follows a Bernoulli distribution with $p_0=6/38$. Use the hypothesis test developed in (a) to test H_0: $p=p_0$ H_1: $p\neq p_0$ for each of the 38 numbers using the data of 50 runs with $\alpha\approx0.1$. Repeat the tests using the 100 runs and 500 runs data. What are the p values?