Hypothesis Testing on $\mu$ – Classical Approach with known $\sigma$

(1) State the null hypothesis $H_0$ and the alternate hypothesis $H_a$.

(2) Assuming that $H_0$ is true, draw the distribution of sample means for samples of size $n$ as guaranteed by the Central Limit Theorem and label both the $\bar{x}$ scale and the $z$ scale.

(3) Pick the level of significance $\alpha$ or use the specified value of $\alpha$. This will allow you to determine the exact location of the critical value for the standard normal variable $z$, if you are performing a one-tail test, or it will allow you to determine the two critical values for $z$, if you are performing a two-tailed test.

(4) Get a sample from the population and determine the value of the test statistic $z^* = \frac{\bar{x} - \mu_x}{\sigma_x}$.

(5) If the test statistic lies in the rejection region for $H_0$ we reject $H_0$, whereas if the test statistic lies in the acceptance region for $H_0$, we will not reject $H_0$.

(6) State your final conclusion and summarize the important features of the hypothesis test such as size of the sample, the level of significance, and one or two tailed test. Also, comment on whether the size of the sample mean appears to be due to random chance or not.

Recall that the Central Limit Theorem allows us the draw a normal distribution in step (2) if the parent population is normal, no matter what the sample size is. On the other hand, if the parent population is not normal, then sample size must be $\geq 30$, in order to use a normal distribution in step (2).