Ⅰ. Short Review

1. Confidence Interval

CI = $\bar{X} \pm Z(\text{or } t)\sigma_X$: Calculate σ_X, Find $Z(\text{or } t)$,and Interpretation .

If N < 30, use t value (Degree of Freedom and $\frac{\alpha}{2}$; $\alpha = 1 - \text{Confidence Interval}$)

2. Hypothesis Test
   - The difference between true mean or proportion and sample mean or proportion is statistically significant ? => Test H_0
   - Null Hypothesis(H_0) ; H_0 : $\mu = \mu_0$
   - Alternative Hypothesis(Ha or $_{1,\text{ etc.}}$) ; Ha : $\mu \neq (\text{or } >, <)\ \mu_0$
   - Reject H_0 : we believe, at a certain level of statistical significance, that the relationship is not due to sampling error and really reflects a true difference in the population.
   - Type I error : Reject the null when it is true. TypeⅡerror : Fail to reject the null when it is false.
   - Level of significance : the probability of making a Type I error ; α=0.05.

   - Test

   Step1 : Determine Appropriate Test Statistic

   Step2 : Formulate the Null Hypothesis. H_0 : $\mu = \mu_0$

   Step3 : Calculate Appropriate Test Statistics(Z or t) / Step 4 : Find Critical Value

   Step 5: Compare Z_{obs}(or t) to Z_{crit} (or t) and Decision

   Step 6 : Interpretation : At the 0.05 level of significance, we can rule out sampling error as the only cause for difference ~.

3. Test for Proportion
   - $N \geq 200$: Z test, otherwise binimial distribution test
   - H_0 : $\pi = \pi_0$ (π : population proporion, p : sample proportion)
   - Z = $\frac{p - \mu_\pi}{\sigma_\pi}$; $\sigma_\pi = \sqrt{\frac{\pi(1-\pi)}{N}}$

Ⅱ. Problems

1. In our factory, the measurement machine was out of order. So it got repaired. After that, we used the machine, and we had 5 sample data 78, 83, 68, 72, 88. Before a trouble, the mean of measurement was 70. Can we conclude the machine is same as before?

2. The# of birth defect of city A in Texas was 68 among 36000 in 2009. The birth defect rate of Texas was 0.0016. Can we say the rate of birth defect in city A was more or less than the average rate of Texas ?