AS2 (Assignment 2, Unit 4): Computing the Z-test Statistic

Research Scenario #1

A researcher hypothesizes that zylex, a new antidepressant, will affect concentration. It is known that scores on a standardized concentration test is normally distributed with a µ= 50 and a σ= 12. A random sample of n=16 participants, aged 19-35, are chosen from the State of New Jersey. The sample is put on a six month dosage plan of zylex. After six months, all the participants are given a standardized concentration test. The researcher records the data and calculates a sample mean of M=56. Are the data sufficient to conclude that the drug, zylex, does have an effect on concentration?

Based on the above research scenario, please answer the following questions:

1. Name the population: _____the people who took standardized concentration test not taking zylax_____

2. Name the sample: _____16 participants, aged 19-35 form New Jersey_____

3. What is the independent variable? _____Zylex_____

4. What is the dependent variable? _____Concentration_____

5. What is the appropriate hypothesis test? _____Z-test non-directional, 2 tails_____

6. What two means are you comparing in this test? ___ µ= 50 from the population of people who took the concentration test and the sample mean of M=56 (data from 16 participants) who took zylex_____

7. Please calculate the appropriate hypothesis test using all four steps:

Step 1: Ho – Zylex will have no effect on the concentration.

H1- Zylex will affect concentration.

Step 2: non-directional z-test, critical regions z-scores of 1.96 and -1.96

Critical Regions

$\alpha = .05$

$z_{CV} = \pm 1.96$

f

-2   -1   0   +1   +2
-1.96   +1.96

Step 3: Z=2

Step 4: ___Reject Ho_____

Write the statistical statement for your results: ___Our study supports that zylex did have an effect on concentration. The data was significant z=2, p<0.05_____

Interpret your results (relating back to the hypothesis): __Based on the data from the sample we came to the conclusion that zylex will affect concentration.
_____
_____
_____

Is there a probability of Type I error? Yes _____   No _____

If yes, what is the probability of a Type I error? ___5%_____

Is yes, how could you have decreased that probability? ____Changing the alpha level _____

Is there a probability of Type II error? Yes_____ No_____

If it is appropriate, please calculate effect size: Answer:____d=0.5 (medium effect)_____

Research Scenario #2:

A researcher wanted to study the effect of alcohol on reaction time. She hypothesized that alcohol will INCREASE reaction time (participants will take longer to react). She selected a sample of n= 36 participants from Rutgers University. The 36 participants each consumed a 6-ounce glass of wine. Thirty minutes later, the researcher measured each participant's reaction time, using a standardized driving simulation task for which the regular population has a $\mu = 400$ msec reaction time with a $\sigma = 48$. The reaction time mean for the sample was M= 412 msec. Are the data sufficient to conclude that the alcohol significantly increased reaction time?

Based on the above research scenario, please answer the following questions:

1. Name the population: the people who took standardized driving simulation task

   _____

2. Name the sample: __36 people who were consuming wine before taking the driving test_____

3. What is the independent variable? _____alcohol_____

4. What is the dependent variable? _____reaction time_____

5. What is the appropriate hypothesis test? ____directional z-test_____

6. What two means are you comparing in this test? The mean of the population μ = 400 and the mean of the chosen sample M= 412 _____

7. Please calculate the appropriate hypothesis test using all four steps:

Step 1: Ho- Alcohol will not increase the reaction time.

H1- Alcohol will increase the reaction time.

Step 2: directional z-test critical region=1.65

Standard normal distribution ($\mu = 0$, $\sigma^2 = 1$)
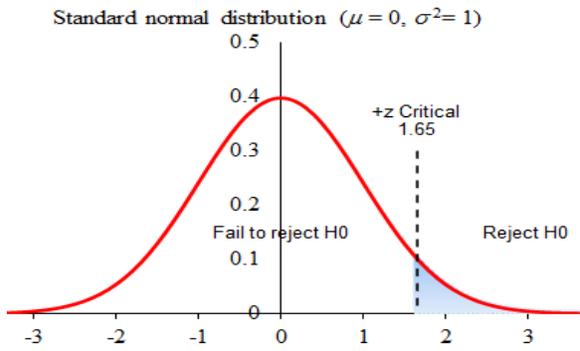
Step 3: z=1.5

Step 4: _Failed to reject Ho_____

Write the statistical statement for the results: __Our study supports that alcohol did not increase the reaction time. The data was insignificant Z=1.5 p<0.05_____

Interpret your results (relating back to the hypothesis): __Based on the data from the sample we made a conclusion that alcohol didn't increase the reaction time

_____
_____
_____

Is there a probability of Type I error? Yes _____ No_____

Is there a probability of Type II error? Yes _____ No____

If appropriate, please compute effect size: Answer: ___d=0.25 (small effect)____