**Z-Tests and T-Tests**

The percent of hospitals in Region 3 of the northwestern United States that reached maximum occupancy at least once in January 2015 was 82%. The regional administration wants to conduct a study to determine if the rate has changed. Before conducting the study, she assumes that the average rate is still 82%. She calls a sample of 20 hospitals in the region and finds that 14 of the 20 reached maximum occupancy at least once during the most recent January. Conduct a hypothesis test at the 95% confidence level to determine if there is statistical evidence to suggest that the proportion of hospitals who reach maximum occupancy at least once per January in region has changed and is no longer 82%. Use this information to answer questions 1-4.

1. Identify the correct critical value, Zα/2.
2. Calculate the test statistic, Ztest.
3. Calculate P(Z > |Ztest|).
4. Compare the test statistic to the critical value. Compare P(Z> |Ztest|) to α. Is there statistical evidence to suggest that the hospital max occupancy rate is less that the rate was in 2015?

A sleep center hypothesizes that people who sleep only four hours will score lower than people who sleep for eight hours on a cognitive skills test. The center recruited 20 participants and split them into two groups. The following morning, the CAT (Cognitive Ability Test) was conducted, with scores ranging from 1-9, 9 being the best score. Use this information to answer questions 5-9.

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|  | CAT Scores | | | | | | | | | |
| Group X: Eight hrs sleep | 4 | 7 | 9 | 4 | 3 | 3 | 8 | 6 | 3 | 7 |
| Group Y: Four hrs sleep | 7 | 8 | 1 | 4 | 2 | 3 | 5 | 2 | 7 | 4 |

1. Calculate the mean and standard deviation of the scores for each group.
2. Using the correct degrees of freedom (df = n + n - # of groups), the correct number of tails, and for a 90% Confidence Level, determine the critical value of *t*.
3. Calculate the pooled variance (formula for S2 is onpage 379) for the groups. Explain under which scenarios using a pooled variance be inadvisable.
4. Calculate the test statistic, Ttest (formula for *t* is on page 380).
5. The sleep center’s statistician tells you that the p-value for the test is 0.1535. Summarize the result of the study. Compare the mean scores in each group. Compare the test statistic to the critical value. Compare the p-value to alpha. Do you find a statistically significant difference between Group X and Group Y on cognitive test performance? Explain your decision.