Hypothesis Testing Worksheet 3

This assignment will count as HW8 instead of a lab score. It will be worth 5 points. Either write your answers in Rmarkdown or upload a copy of your handwritten answers to gradescope for the HW8 submission. Due date TBD.

Question 1 – Sleep deprivation, CA vs. OR (2 pts)

A CDC report on sleep deprivation rates shows that the proportion of California residents who reported insufficient rest or sleep during each of the preceding 30 days is 8.0%, while this proportion is 8.8% for Oregon residents. These data are based on simple random samples of 11,545 California and 4,691 Oregon residents.

Goal: Conduct a hypothesis test to determine if these data provide strong evidence that the rate of sleep deprivation is different for the two states.

Part A: What type of hypothesis test is this? (proportion / diff. in proportions/ mean / diff. in means)

Part B: Compute $\widehat{p}_{pool}$.

Part C: Compute the test-statistic Z.

Part D: Compute the p-value using `pnorm()`.

Part E: Write a conclusion to this question using 'strength of evidence'.

Question 2 – Find the P-value with t-distribution (.5 pts)

A random sample is selected from an approximately normal population with an unknown standard deviation. Find the p-value for the given sample size and test statistic using `pt()`.

Part A: n = 26, T = 2.485, two-tail test

Part B: n = 18, T = 0.5, right-tail test

Question 3 – Piano (1 pt)

Georgianna claims that in a small city renowned for its music school, the average child takes less than 5 years of piano lessons. We have a random sample of 35 children from the city, with a sample mean of 4.6 years of piano lessons and a sample standard deviation of 2.2 years.

Evaluate Georgianna's claim using a hypothesis test.

- state hypotheses
- check conditions
- calculate test-statistic
- p-value
- conclusion

Question 4 – Diamonds (1.5 pts)

We have data on two random samples of diamonds: one with diamonds that weigh 0.99 carats and one with diamonds that weigh 1 carat. Each sample has 23 diamonds. Sample statistics for the price per carat of diamonds in each sample are provided below.

0.99 Carats

Sample mean = \$44.51, s.d. = \$13.32, n=23

1 Carat

Sample mean = \$57.20, s.d. = \$18.19, n=23

Assuming that the conditions for conducting inference using the t-distribution are satisfied, perform a hypothesis test to see if there is a difference in population prices per carat of diamonds that weigh 0.99 carats and 1 carat. (Wickham 2016)