Problem Set 12

STAT-S 520

Due on Friday April 21th, 2023

Instructions:

- Submit your answers in Canvas as a single PDF file with answers in proper order.
- Include your R code, graphs, and relevant output.
  - Check that only the relevant output is included in your submission. Pages and pages of output that are not relevant can be penalized.
- You are allowed to collaborate with your classmates as long as you write your own solutions.

Questions

1. You'll work with ISI Section 13.4 Exercise 2, as follows:
   a. Answer the question using the theory-based approach. Use G^2.
   b. Answer the question using the simulation-based approach. Use X^2.
   c. Select the appropriate two current proportions (for exactly two M&M's colors) under H_0 and modify them by increasing one by 0.03 units and decreasing the other by 0.03 units in such a way that the conclusion of the test performed in part a changes. Show you work and explain how have you determined the appropriate two colors to change.
2. You'll work with ISI Section 13.4 Exercise 4, as follows:
   a. Answer the question using the theory-based approach. Use G^2.
   b. Answer the question using the simulation-based approach. Use X^2.
   c. Assume now that the researchers still devised a computer algorithm that was intended to color each pixel, independently and identically, black with some fixed probability p and white with probability $1 - p$, but this probability is not longer given (i.e. it may or may not be 0.29, we do not know anymore).
      i. Find $\hat{p}$, the estimated probability for this problem based on the data.
      ii. Do the degrees of freedom for the problem change? Answer Yes or No and explain why.
3. You'll work with ISI Section 13.4 Exercise 11, as follows:
   a. Answer the question using the theory-based approach. Use G^2.
   b. Answer the question using the simulation-based approach. Use X^2.

Reading Assignments

- For Tuesday:
  - ISI Section 13.3.
- For Thursday:
  - Canvas notes on linear regression, part 1.