Homework 9 (Problems 1 to XX) Due on May 6 Math 125 Kovitz Spring 2021

Send your work and answers as a pdf attachment to an email by May 6.

- 1. A die is rolled 1,000 times. The totl number of spots is 3,711 instead of the expected 3,500. Can this be explained as a chance variation, or is the die loaded?
- 2. In order to test anull hypothesis, you need
 - (i) data
 - (ii) a box model for the data
 - (iii) both of the above
 - (iv) none of the above
- 3. The ______ hypothesis says that the difference is due to chance but the ______ hypothesis says that the difference is real.

Fill in the blanks. Options: null, alternative.

4. According to one investigator's model, the data are like 50 draws made at random from a large box. The null hypothesis says that the average of the box equals 100. The alternative says that the average of the box is more than 100. The average of the draws is 107.3 and the SD is 22.1. The SE for the sample average is 3.1. now

z = (107.3 - 100)/3.1 = 2.35 and P = 1%.

True or false, and explain:

- (a) If the null hypothesis is right, there is only a 1% chance of getting a z bigger than 2.35.
- (b) The probability of the null hypothesis given the data is 1%.
- 5. True or false, and explain.
 - (a) The observed significance level depends on the data.
 - (b) If the observed significance level is 5%, there are 95 chances in 100 for the alternative hypothesis to be right.
 - (c) If P is 43%, the null hypothesis looks plausible.
 - (d) If P is 0.43 of 1%, the null hypothesi looks implausible.
 - (e) If the observed significance level is 3.6%, then P = 3.6%.
 - (f) If z = 2.3, then the observed value is 2.3 SEs above what is expected on the null hypothesis.

- 6. According to one investigator's model, the data are like 400 draws made at random from a large box. The null hypothesis says that the average of the box equals 50. The alternative says that the average of the box is more than 50. In fact, the data averaged out to 53.6, and the SD was 25. Compute z and P. What do you conclude?
- 7. An investigator draws 250 tickets at random with replacement from a box. What is the chance that the average of the draws will be more than 2 SEs above the average of the box?
- 8. An ESP experiment asks the subject to guess unseen which target was chosen randomly from 10 targets by the researcher.

(A subject without ESP guesses as if at random; a subject with ESP has a greater than random chance of guessing correctly.)

Suppose that in 1,000 trials, a subject scores 173 correct guesses.

- (a) Set up the null hypothesis as a box model.
- (b) The SD of the box is _____. Fill in the blank, using one of the options below, and explain briefly.

$$\sqrt{0.1 \times 0.9}$$
 $\sqrt{0.173 \times 0.827}$

- (c) Make the z-test.
- (d) What do you conclude?