## Chapters covered: Chapter 7

## Show your work to receive full credit.

### Textbook Problems : (Statistics, the art and science of learning from data, 4th)

- **Problem 1** Exercise 7.14 (a., b., c. only) Student government election, page 310 .
  Hint: In Part c. we want to find $P(\hat{p} < 0.5)$
- **Problem 2** Exercise 7.17 (Rolling one die, page 323)
- **Problem 3** Exercise 7.38 (Home runs, page 327) (Hint: In part c, we want to find $P(\bar{X} > 1.5)$ where $\bar{X}$ is mean number of home runs per game during a season (162 games)).

- **Problem 4** Exercise 7.57 Multiple choice : CLT (page 330)
- **Problem 5** Exercise 7.59 Multiple choice : sampling distribution (page 330)
- **Problem 6** Simulating the exit poll. In this problem we will carry out a simulation using the actual population proportion $p = 0.54$, that voted for Tim Walz in the 2018 Minnesota gubernatorial election.

  To simulate an exit poll, :

  - Go to `https://istats.shinyapps.io/SampDist_Prop/`
  - On the left side of screen, set **Population Proportion** $p$ as 0.54.
  - Set sample size $n$ as 10, which represent a random sample of 10 voters. (Check "Enter Numerical Values for n and p")
  - Click 'Draw sample(s)'. Observe how 'Data distribution' and 'Sampling distribution'. Note that data distribution gives a simulated results of Tim Walz voters (success) among 10.
  - If we draw samples repeatedly, 'Data distribution' shows the most recent experiment result and 'Sampling distribution' shows the distribution of the sample proportion ($\hat{p}$) with its mean and standard deviation.

  a. Simulate a sample of size 10. **Submit a screenshot of 'data distribution'**. What proportion of voters vote for Tim Walz in your simulated sample?

  b. Simulate at least 10,000 samples of size n=10. **Submit a screenshot of 'Sampling distribution of sample proportion.'**. What are the mean and standard deviation of the sampling distribution of sample proportion?

  c. Use a formula from Chapter 7 to predict the value of the standard deviation of Sample proportion that you generated in part b.

  d. (True or False) Identify each of i, ii, iii is true or false. If false, explain why.

  If we change the sample size (n) to 500 from 10:

  i the mean of sampling distribution of sample proportion increases.
  ii the standard deviation of sampling distribution increases.
  iii the shape of the sampling distribution becomes approximately normal.

  e. Simulate 10,000 samples of size (n) = 500. Based on the sampling distribution of sample proportion, give an interval where approximately the middle 95% of the distribution falls. (Use 68-95-99.7 Rule). No need to submit a plot.