PS01

Due date: Tuesday, April 16th @ 11:59p.

Instructions

Complete the following questions below and show all work. You may either type or hand write your answers. However, you must submit your problem set to Canvas as an `html` or `pdf`. Meaning any handwritten solutions are to be scanned and uploaded. The onus is yours to deliver an organized, clear, and/or legible submission of the correct file type that loads properly on Canvas. **Do not** simply change the file type and submit (e.g. edit name of document from .jpg $\rightarrow$ .pdf) Double-check your submissions!

Integrity: If you are suspected of cheating, you will receive a zero—for the assignment and possibly for the course. Cheating includes copying work from your classmates, from the internet, and from previous problem sets. You are encouraged to work with your peers, but everyone must submit their own answers. Remember, the problem sets are designed to help you study for the midterm. By cheating, you do yourself a disservice.

Questions

Each question is worth 2 pts each.

001. In the board game *"Settlers of Catan"*, two dice are rolled each turn and summed together. Let X be a random variable that describes the sum of these two dice.

- (a) What is the sample space of X?
- (b) What is the probability density function (PDF) of X?
- (c) What are the three most likely outcomes if X?

002. Find the expected value, $\mathrm{E}(X)$, of random variable X from problem 001.

003. Find the variance, $\mathrm{Var}(X)$, of random variable X from problem 001.

004. Let X be the same random variable from problem 001 and Y be equal to:

$$Y = 2X + 3$$

- (a) Calculate $E[Y]$. Is it is the same as $2E[X] + 3$
- (b) Calculate $Var[Y]$.

005. Suppose we have random variables W and Q, and we know $\mathrm{Var}(W) = 25$, $\mathrm{Var}(Q) = 10$, and $\mathrm{Cov}(W, Q) = 2$. Now, let $A = 2W + 4Q$. What is $\mathrm{Var}(A)$?