Assignment #11

Due on Friday, March 13, 2020

Read Section 5.2 on *Properties of Expectations* in the class lecture notes at
`http://pages.pomona.edu/~ajr04747/`

Read Section 5.4 on *Variance* in the class lecture notes at
`http://pages.pomona.edu/~ajr04747/`

Read Section 4.2 on *Properties of Expectations* in DeGroot and Schervish.

Read Section 4.3 on *Variance* in DeGroot and Schervish.

Do the following problems

1. Let $X \sim \text{Uniform}(1, 2)$. Compute the variance of X.

2. Let $a \in \mathbb{R}$ and X be a discrete random variable with pmf

$$p_X(x) = \begin{cases} 1, & \text{if } x = a; \\ 0, & \text{elswhere.} \end{cases}$$

   Compute the variance of X.

3. Let X be a continuous random variable with variance σ^2. Define $Y = cX$, for some constant c. Compute the variance of Y in terms of σ^2.

4. Suppose that one word is selected at random from the sentence

   THE GIRL PUT ON HER BEAUTIFUL HAT.

   If X denotes the number of letters in the word that is selected, what is the value of $\text{Var}(X)$?

5. Suppose that X is a random variable for which $E(X) = \mu$ and $\text{Var}(X) = \sigma^2$. Show that
$$E[X(X - 1)] = \mu(\mu - 1) + \sigma^2.$$