
STATISTICAL COMPUTING ACTIVITY

3q: Skill Check

Purpose: The purpose of this activity was to show you how to deal with some discrete random variables in R. You will want to know how to calculate point probabilities, cumulative probabilities, and quantiles. You will also want to be able to generate random variables based on the distribution. This last will help you better understand the variables and functions of the variables.

As always, this is where you test if you currently understand the material. Treat this like a test. Doing so will help retention and understanding. Both are important as we move forward through the course. You can think of this SCA and the next as hints to what you can do with the distributions in terms of modeling real-world processes.

Remember, these SCAs are for training. They give you the basics on how to use R. Success in these SCAs help ensure you are able to perform statistical analyses as well as learn the most from the Laboratory Activities in the course.

To Do:

0. Make sure you import the functions for this course using the line:

```
source("http://rfs.kvasaheim.com/stat200.R")
```

1. Draw a random sample of size 1000 from a Binomial distribution with $n = 10$ and $p = 0.50$.
2. Calculate $P[X = 5]$, where $X \sim \text{Bin}(10, 0.50)$.
3. Calculate $P[Y \leq 8]$, where $Y \sim \text{Pois}(\lambda=10)$.
4. Draw a random sample of size one million from a Poisson distribution with $\lambda = 10$. Calculate the mean of this sample. Calculate the variance of this sample. From what you know about the Poisson distribution, what are the “true” values of the mean and variance? How close did your estimate come?
5. Draw two random samples, each of size one million. Let X come from a $\text{Bin}(n=10, p=0.50)$ distribution. Let Y come from a $\text{Pois}(\lambda=10)$ distribution. Provide a histogram of the random variable Z , which is defined as $Z = X \times Y$. Exactly, what are the means and variances of X and Y ? What are the mean and variance of Z ?