Lab 3 Assignment

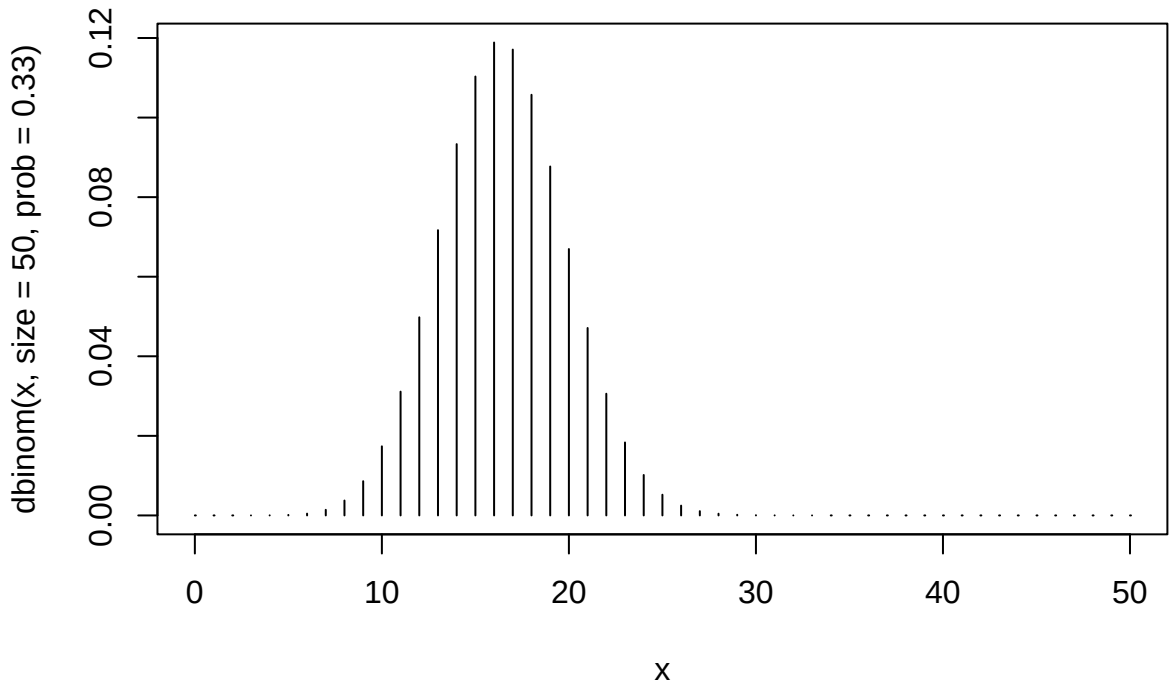
Dr. Purna Gamage

Problem 1:

Plot probability density histograms for these discrete distributions (hint: use the d. . . () function).

a. Binomial Distribution

```
x <- 0:50
plot(x,dbinom(x,size=50,prob=.33),type="h")
```



b. Discrete uniform

```
library("extraDistr")
```

c. Bernoulli

d. Poisson

e. Geometric

f. Hypergeometric

g. Negative binomial

Problem 2.

Suppose there are fifteen multiple choice questions in ANLY511 midterm test. Each question has four possible answers, and only one of them is correct. Find the probability of having four or less correct answers if a student attempts to answer every question at random.

a. Compute the probability of having exactly 4 correct answers by random attempts using *dbinom()* and *pbinom()*.

b. Find the the probability of having four or less correct answers by random attempts using *dbinom()*.

c. Compute the above probability(part-b) using *pbinom()*.

Problem 3:(use r to find the prob)

a. Assume an insuarance company recieves 3 motor vehicale insurance claims per week. What is the probability that they recieve 11 or fewer claims during a month?

$$P(X \leq 11)?$$

b. While you are at the Georgetown library terrace, you notice that airplanes fly at an average rate of 1 every 4 hours. What is the probability that you will see atleast one plane in the next hour?

Problem 4: Try this example with *..nbinom()*

(This relates to Example 1 in Lab 1)

Mike had the first three successes in trials 6, 8, and 9. He had six failures until he reached three successes.

Do you think Mike has *success probability p = 0.5 or better?* Can a simulation give an answer?Let's try.

1. If Mike's success probability is p = 0.5 What is the probability that he will obtain these 3 successes?.
2. Run many simulations (say 10,000) with this success probability to find the same probability $P(X = 6)$? *Hint: Use rnbinom()*
3. If Mike's success probability were 0.5 or better, he would not need a lot of attempts. Find the probability that three successes were reached after 9 tosses or later by somebody with success probability 0.5. $P(X \geq 6)$

a. Calculate the probabiliy using both *dnbinom()* and *pnbinom()*.

b. Calculate this probability using a Simulation(10,000)

c. Is this probability (part b) the same as you got from "myattempts": Lab 1 Assignment Problem 1 part 3?