

1. QR CODES FOR THIS DOCUMENT IN SAGEMATH CELL



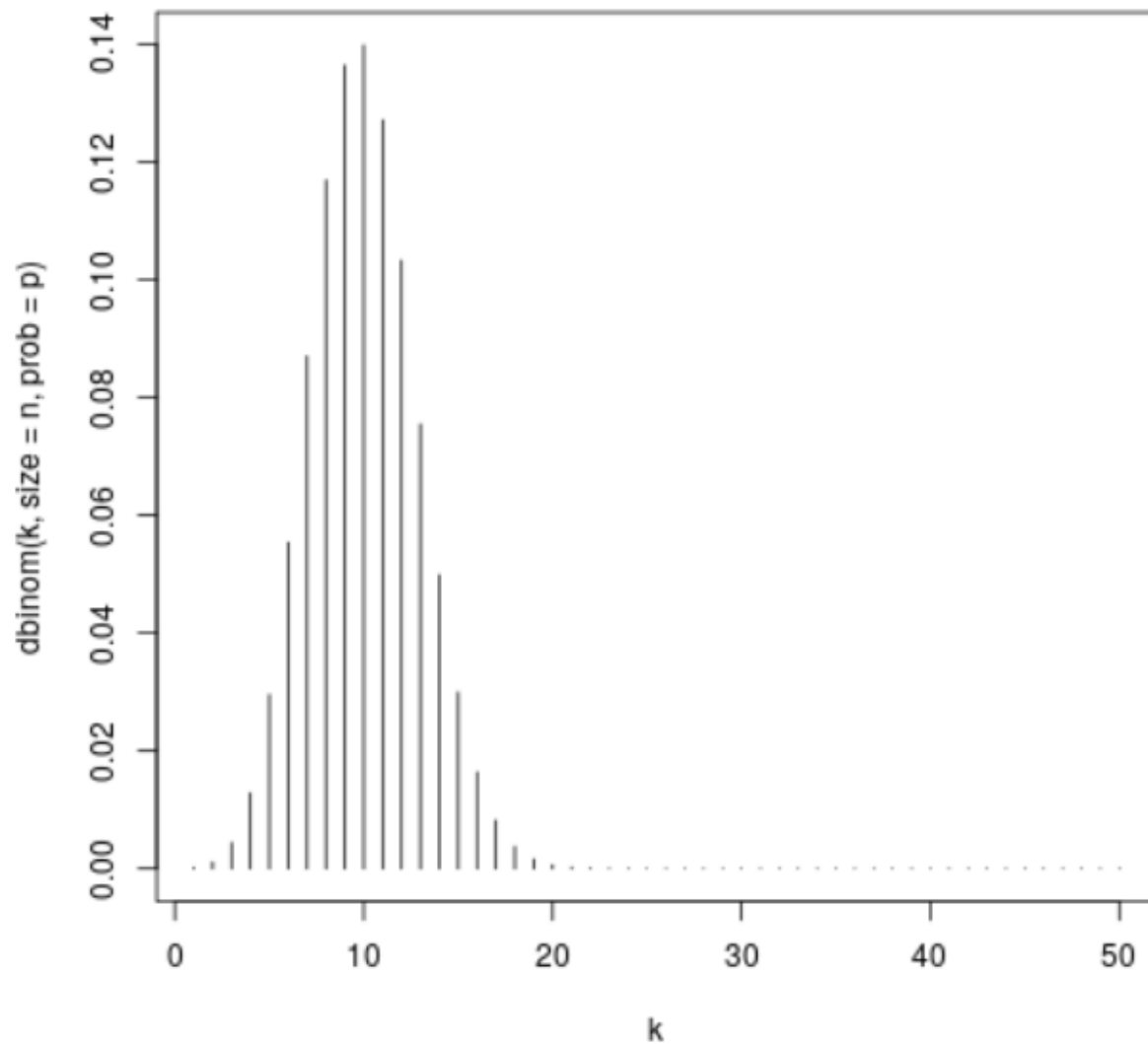
2. HERE'S AN EXAMPLE R SCRIPT

```
# probability of success
p <- 0.2

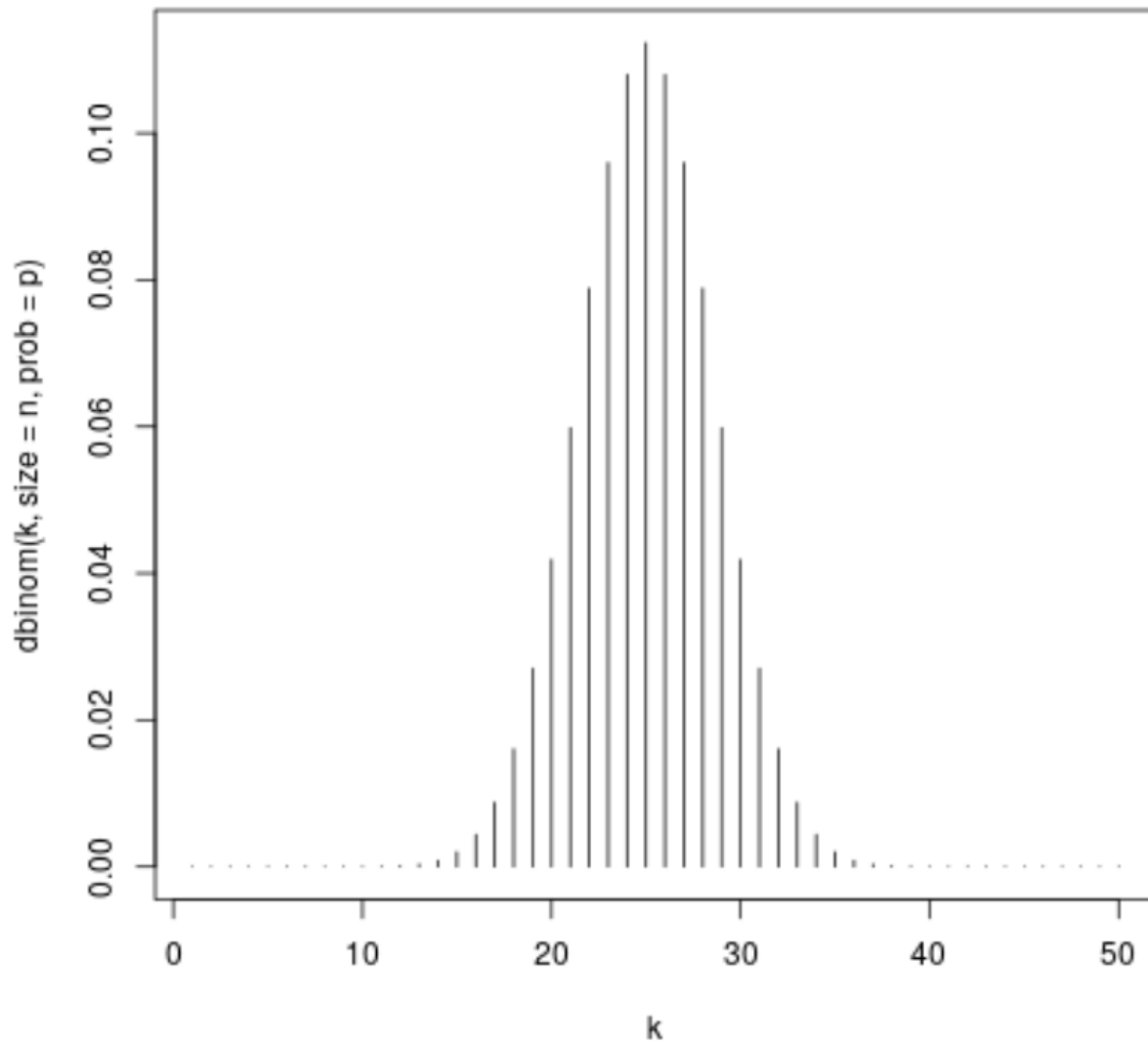
# number of trials
n <- 50

# the support vector of the distribution (why is the upper limit n?)
k <- c(1:n)

# here's an R command to plot values k (from 1 to n) on the horizontal axis
# and to plot the PMF  $p_X(k)$  of the random variable  $X \sim \text{Bin}(n,p)$  on the vertical axis
# (the PMF  $p_X(x)$  is just the probability  $P(X = k)$  of  $k$  exactly successes in  $n$  trials)
plot(k, dbinom(k, size=n, prob=p), type="h")
```



3. HOW WOULD YOU PRODUCE THIS PLOT?



4. CHEWIE THE WOOKIE EATS A COOKIE

How does this code

```
# probability of success
p <- 14/40
# number of trials
n <- 4
# support of distribution
k <- c(1:n)
# plot
plot(k,dbinom(k,size=n,prob=p),type="h")
```

help to answer the question from last Friday's quiz related to Chewie the Wookie's snacks?

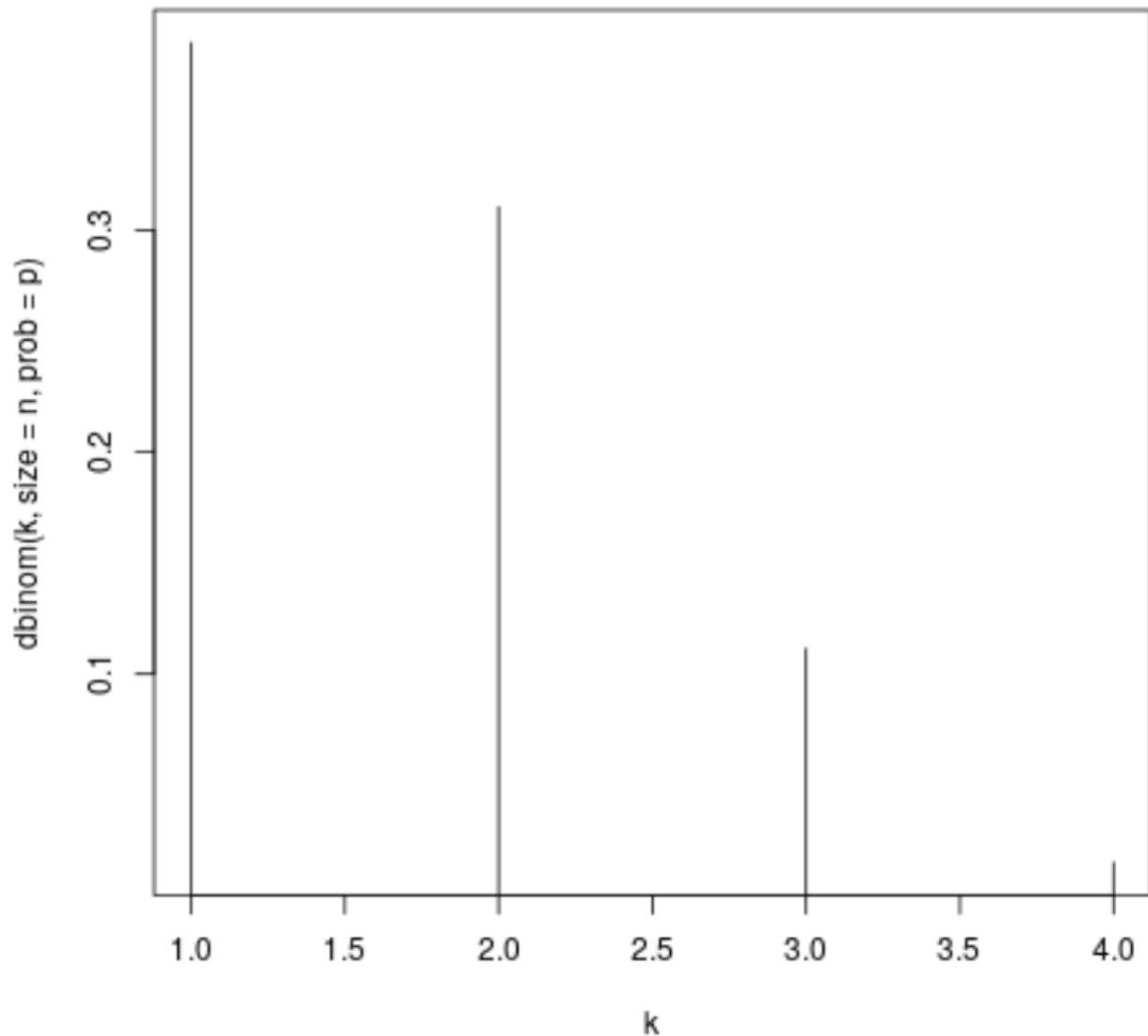
A. Chewie the Wookie has 4 identical boxes of snacks. Each box contains 40 snacks (18 purple snacks, 14 red snacks, and 8 green snacks). Chewie selects one snack at random from each box. What is the probability that exactly 1 of the 4 snacks is a red snack?

If you answered correctly, you might have used a TI-84 calculator to calculate `binompdf(4,14/40,1)`, which returns 0.384475. Let's look at a solution from the perspective of an R programmer.

First off, since you already know what a random variable is, let's be fancy: let r.v. $X \sim \text{Bin}(4, 14/40)$ be the number of red snacks that Chewie draws.

1. Why is this an appropriate probability model to answer the quiz question?

Here's the plot of the PMF for the r.v. X . It is just the plot as k increases from 1 to 4 of the probability that the binomially distributed random variable X is equal to k .



2. Where is the value 0.384475 represented on the plot of the PMF?
3. For what value of k is the PMF of the binomial distribution $p_X(k) = P(X = k)$ equal to 0.384475?
4. Where is the value 0.615525 represented on the plot of the PMF?
5. Can you write $P(X \neq k)$ as a sum of values on the plot of the PMF?