Max Shi
September 13, 2019
Professor Li
MA 332 Homework 2
I pledge my honor that I have abided by the Stevens Honor System.

1 (i)

```
pbinom(8.25, 20, 0.4)
[1] 0.5955987
pbinom(8.25, 30, 0.4)
[1] 0.09401122
pbinom(8.25, 50, 0.4)
[1] 0.0002305229
pbinom(8.25, 100, 0.4)
[1] 5.431127e-13
```

1 (ii).

$P(N <= 8.25) = \phi(\frac{8.25-np}{\sqrt{np(1-p)}})$

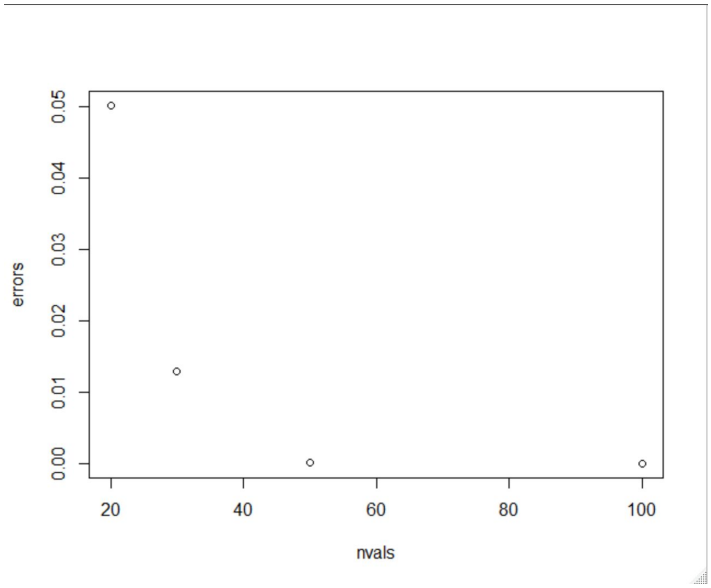
For n = 20, $P(N <= 8.25) = \phi(\frac{8.25-20*0.4}{\sqrt{20*0.4(1-0.4)}}) = \phi(\frac{0.25}{\sqrt{4.8}}) = \phi(0.1141) = 0.5454$

For n = 30, $P(N <= 8.25) = \phi(\frac{8.25-30*0.4}{\sqrt{30*0.4(1-0.4)}}) = \phi(\frac{-3.75}{\sqrt{7.2}}) = \phi(-1.397) = 0.08113$

For n = 50, $P(N <= 8.25) = \phi(\frac{8.25-50*0.4}{\sqrt{50*0.4(1-0.4)}}) = \phi(\frac{-11.75}{\sqrt{12}}) = \phi(-3.392) = 0.000347$

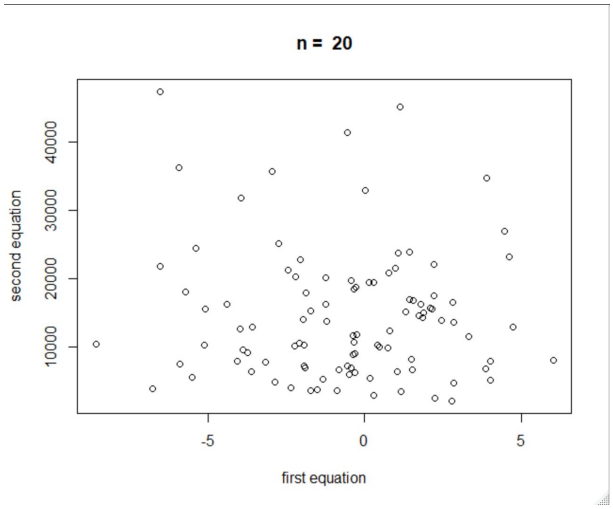
For n = 100, $P(N <= 8.25) = \phi(\frac{8.25-100*0.4}{\sqrt{100*0.4(1-0.4)}}) = \phi(\frac{-31.75}{\sqrt{24}}) = \phi(-6.481) = 4.556 * 10^{-11}$

1 (iii).

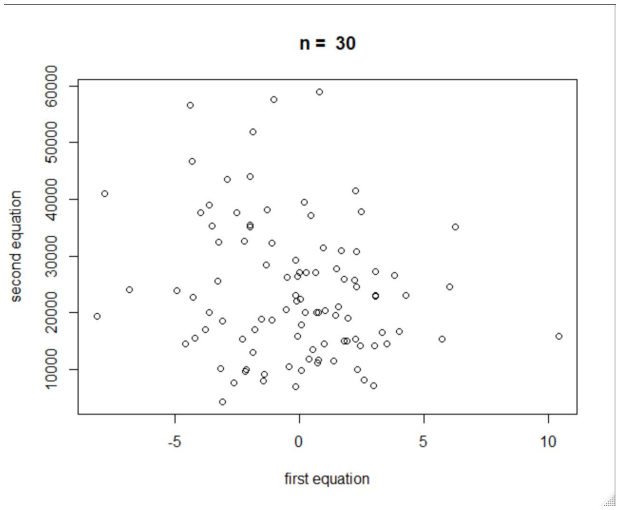


1 (iv). I perceive that as the amount of trials goes up, the Laplace theorem becomes more and more accurate toward the actual value and behavior of a binomial distribution.

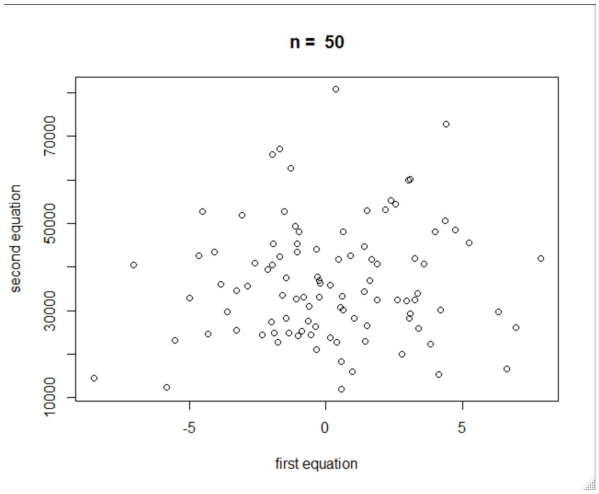
2 (i).



2(ii).



2(iii).



2(iv).

The points seem to be distributed toward the center bottom of the plot. The first equation tends to 0, or distributes close to 0, no matter what the value of n is. However, the range of the first equation decreases as n increases, and it has a tighter distribution around 0. The second equation seems to also tend toward lower numbers, however increases in range as n increases.