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Stat 510

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Homework 6

1.

**a)**

by hand:

|  |  |  |
| --- | --- | --- |
|  | Mean | variance |
| r=1, p=0.5 | = = = 1 | = = = 2 |
| r= 3, p=0.25 | = = = 9 | = = = 36 |

In R:

> x=rnbinom(1000,size=1,prob=.5)

> mean(x);var(x)

[1] 1.014

[1] 2.198002

> x=rnbinom(1000,size=3,prob=.25)

> mean(x);var(x)

[1] 8.977

[1] 36.72319

The hand calculated mean and variance are similar to the values calculated in R. The variance is greater than the mean in both cases.

**b)** = = 1/p >1

This is true when 0 < p < 1. Variance and mean are the same when p=1.

**c)**  r=3, p=0.5

p(x=1)= = = = = 0.1875

p(x≤2) = = = = = 0.1875

> dnbinom(1,size = 3,prob = .5)

[1] 0.1875

> dnbinom(2,size = 3,prob = .5)

[1] 0.1875

The answer is the same for both x values whether it’s calculated in R or by hand.