problem3

February 13, 2023

Bi/Be/Cs 183 2022-2023: Intro to Computational Biology TAs: Meichen Fang, Tara Chari, Zitong (Jerry) Wang

Submit your notebooks by sharing a clickable link with Viewer access. Link must be accessible from submitted assignment document.

Make sure Runtime → Restart and run all works without error

HW 5 (Midterm) Problem 3c. (8 points)

The sum of n i.i.d. geometric random variables with parameter p has a negative binomial distribution with parameters $r = n$ and p.

Draw 10,000 samples from a negative binomial distribution with $r = 10$, $p = 0.5$ and plot your sampled values in the form of a histogram.

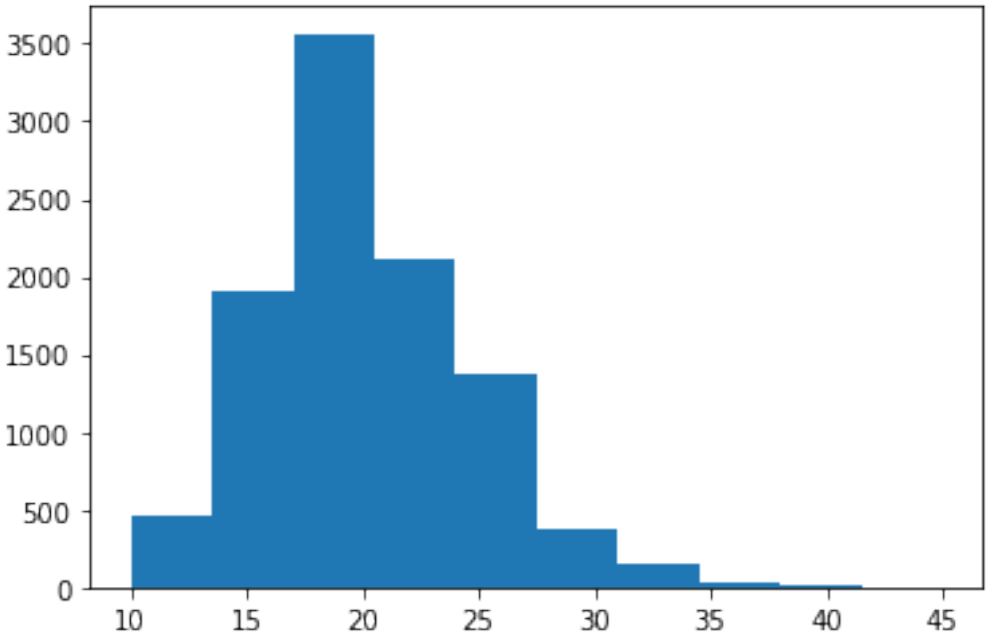
You may **not** use functions that directly generate samples from a negative binomial distribution such as `numpy.random.negative_binomial`. (Hint: a useful function is `numpy.random.geometric`)

```
In [1]: import numpy as np
        import matplotlib.pyplot as plt
```

```
In [2]: n = 10000
        r = 10
        p = 0.5
```

```
In [3]: samples = np.sum(np.random.geometric(p, (r, n)), axis=0)
        plt.hist(samples)
```

```
Out[3]: (array([ 468., 1901., 3564., 2116., 1379.,  373.,  157.,   28.,   10.,
                    4.]),
         array([10. , 13.5, 17. , 20.5, 24. , 27.5, 31. , 34.5, 38. , 41.5, 45. ]),
         <BarContainer object of 10 artists>)
```


3500
3000
2500
2000
1500
1000
500
0
10
15
20
25
30
35
40
45