

ST117 Lab 3 Workbook

2024-01-28

1. Simulating and Visualizing Binomial Distribution

- (a) Generate a random sample of 1000 observations from a binomial distribution with parameters $n = 20$ and $p = 0.5$, then create a histogram to visualize the distribution.

```
# TODO: generate binomial samples
```

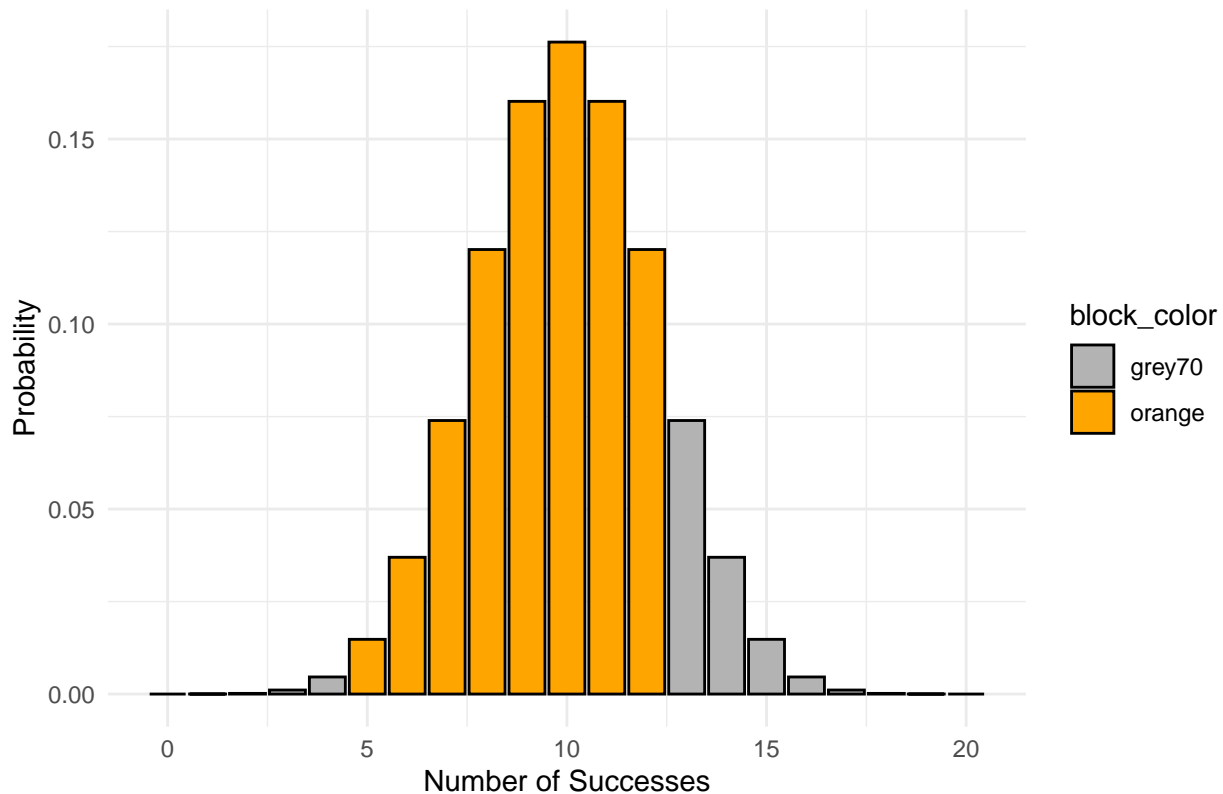
```
# TODO: write down your codes to plot the histogram
```

- (b) Calculate the mean and standard deviation of the generated data. Compare these values with the theoretical mean and variance.

```
# TODO: calculate mean and variance
```

- (c) Flipping a coin 20 times, where it has 50% chance of getting a head. The total number of head X follows a Binomial distribution with $n = 20$ and $p = 0.5$. Find the probability of getting between 5 and 12 heads when tossing 20 coins(which is sum of the orange bars).

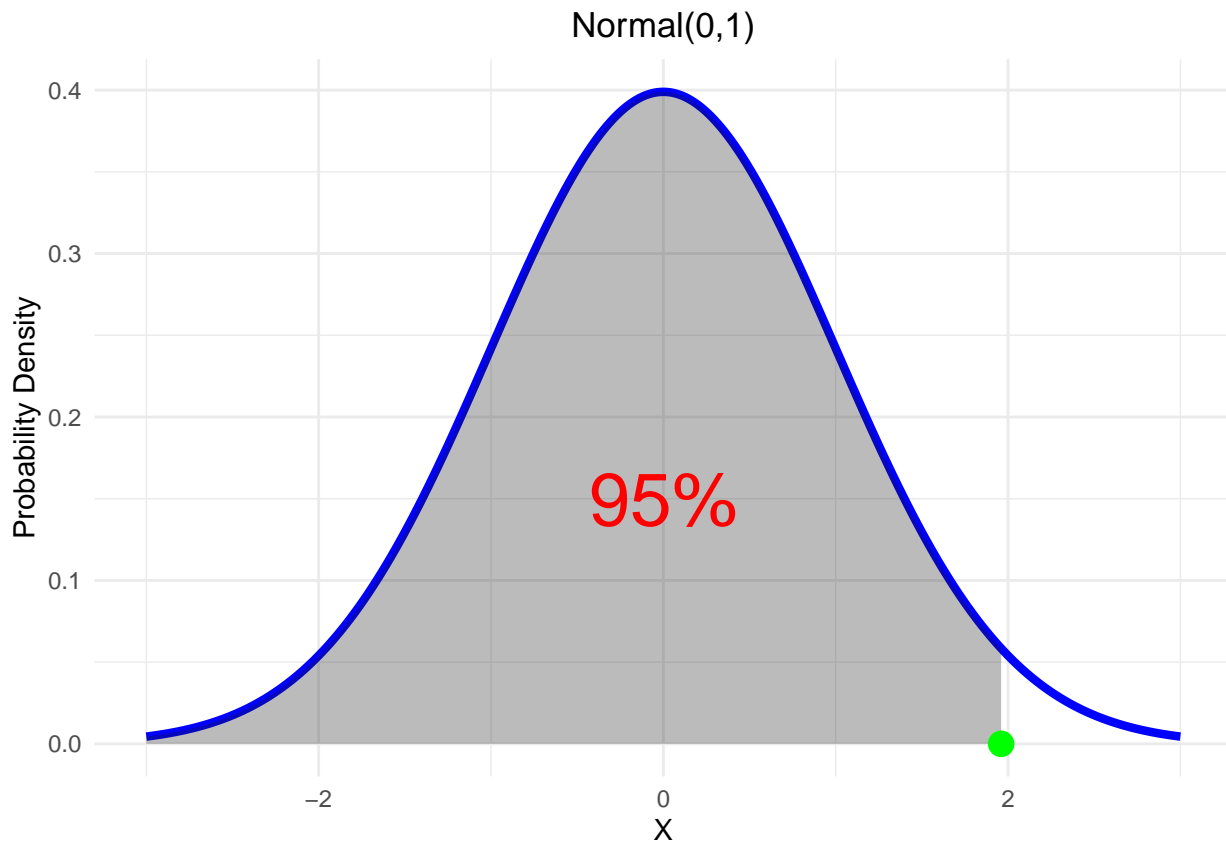
Binomial(20,0.5)



```
# TODO: calculate the probability
```

2. Calculating Probabilities from the Normal Distribution

(a) Suppose $X \sim N(0, 1)$, find the value m (green point) such that $P(X \leq m) = 0.95$



```
# TODO: find m with qnorm
```

(b) Given $X \sim N(2, 0.7^2)$, find the probability of X being between 1 and 4.

```
# TODO: calculate the probability
```

(c) Find the probability of getting a number between 5 and 12 heads for a normal distribution with mean 10 and standard deviation $\sqrt{5}$.

```
# TODO: calculate the probability
```

3. Approximating the Binomial with the Normal distribution

Please write down the questions and answers yourself, following the format above.