EE114 Coding Project 1

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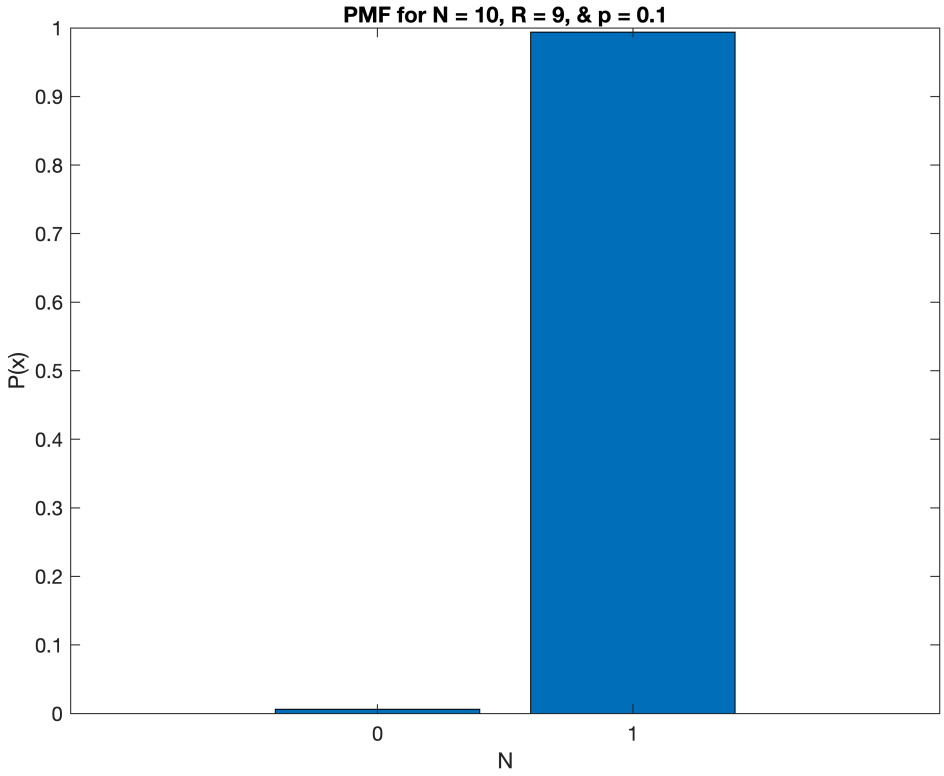
1.

```
Procedure
```

```
M = 1×3
    0.1502    0.3406    0.7075
M = 1×3
     0     0     1
M_encode = 1×9
     0     0     0     0     0     0     1     1     1
M_received = 1×9
     0     0     0     0     0     0     1     1     1
M_decoded = 1×3
    0.9044    0.1464    0.9192
M_decoded = 1×3
     0     0     1
The number of successes are:
ans = 1
```

2.

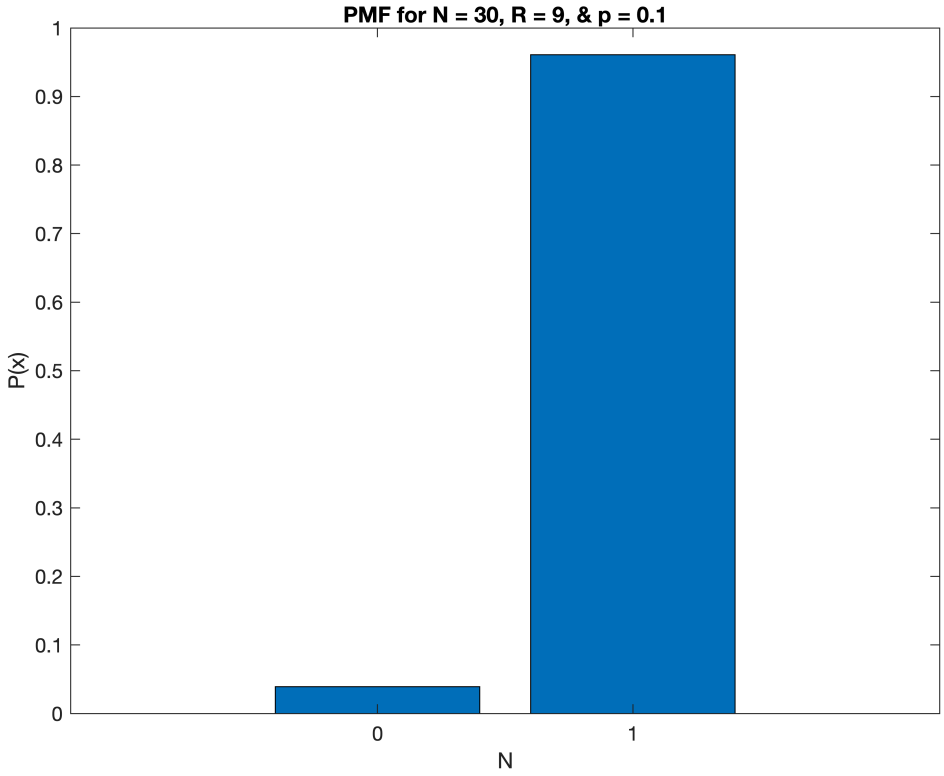
```
    Part_2(10, 9, 0.1)
```




```
The percentage of successes is: 99.4%
ans = 0.9940
```

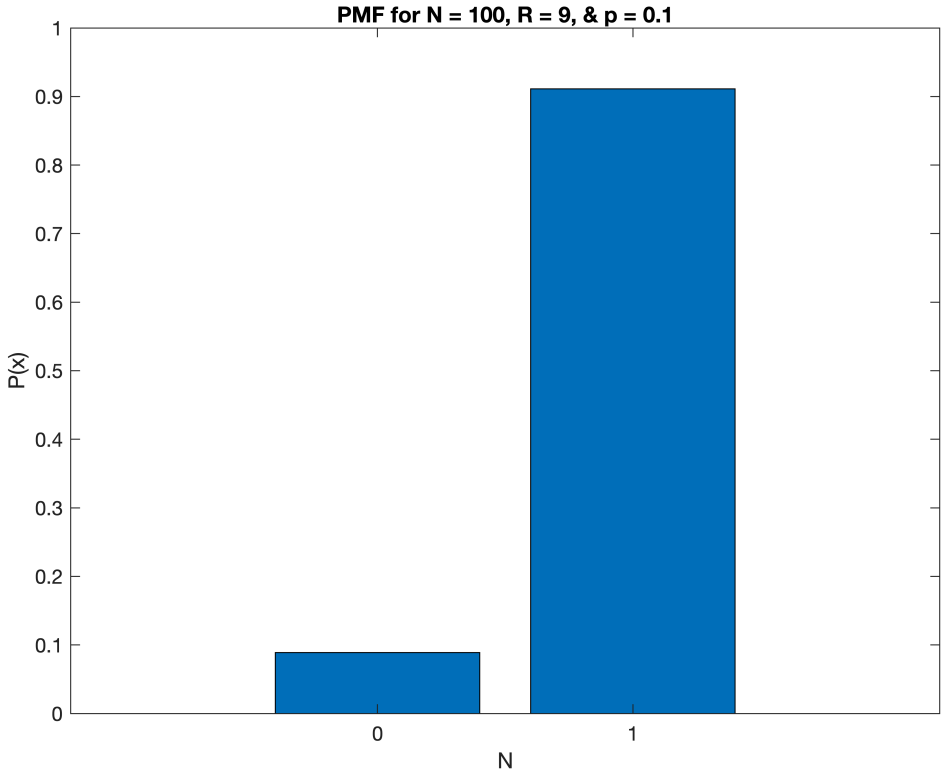
3.

```
Part_2(30, 9, 0.1)
```



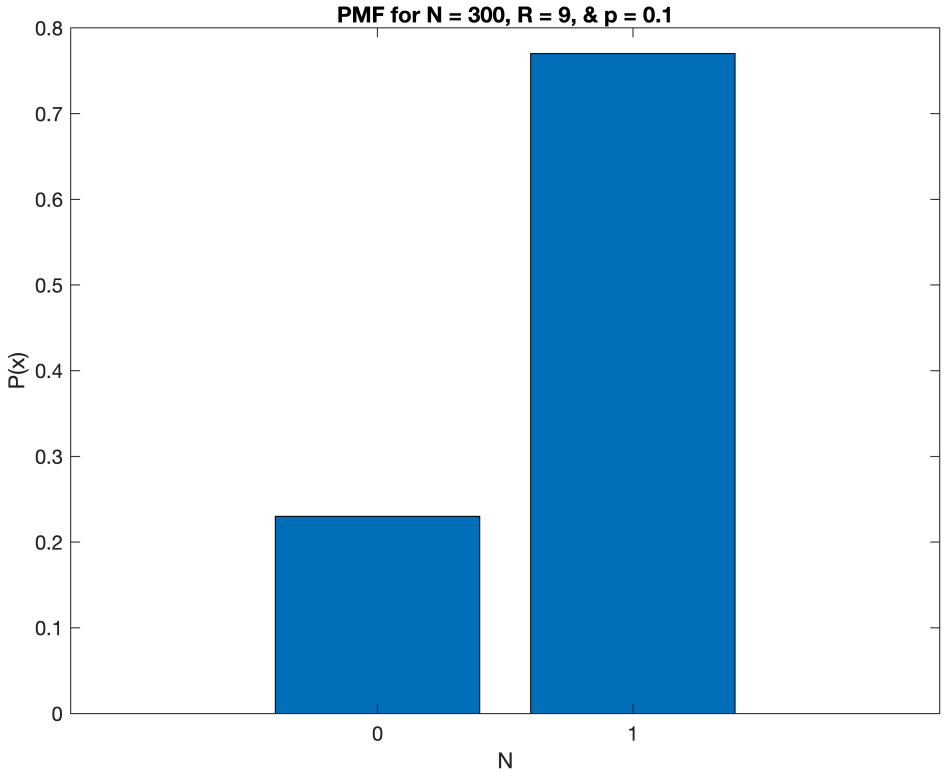

```
The percentage of successes is: 96.1%
ans = 0.9610
```

```
Part_2(100, 9, 0.1)
```



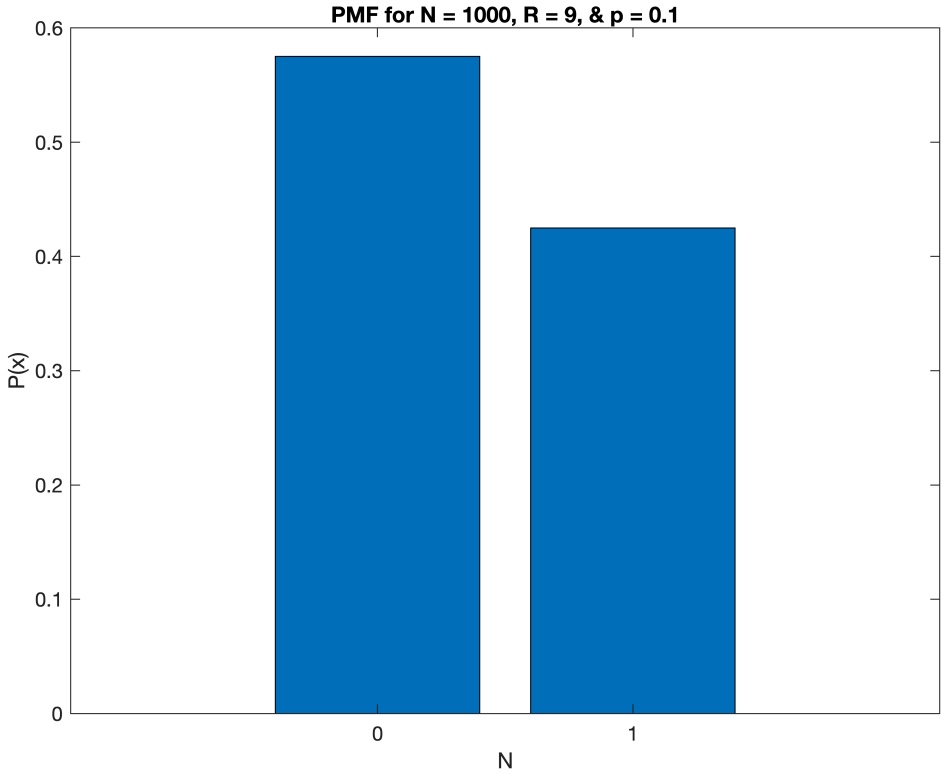

```
The percentage of successes is: 91.1%
ans = 0.9110
```

```
Part_2(300, 9, 0.1)
```




```
The percentage of successes is: 77%
ans = 0.7700
```

```
Part_2(1000, 9, 0.1)
```

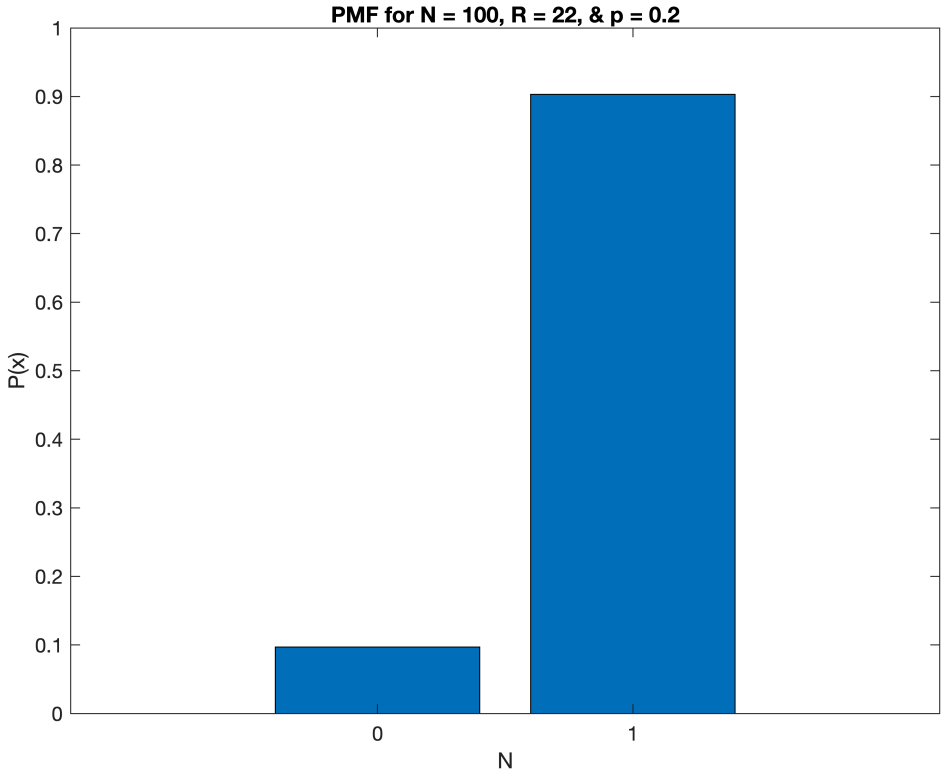



```
The percentage of successes is: 42.5%
ans = 0.4250
```

Based on the PMF we can see that as the number of sequences increases, even while keeping the probability of flops the same, the probability of success decreases. Thus, the majoirty rule for decoding becomes less reliabe as the size of the messages increase. This is not a efficient way to encode communications.

4.

```
Part_2(100, 22, 0.2)
```

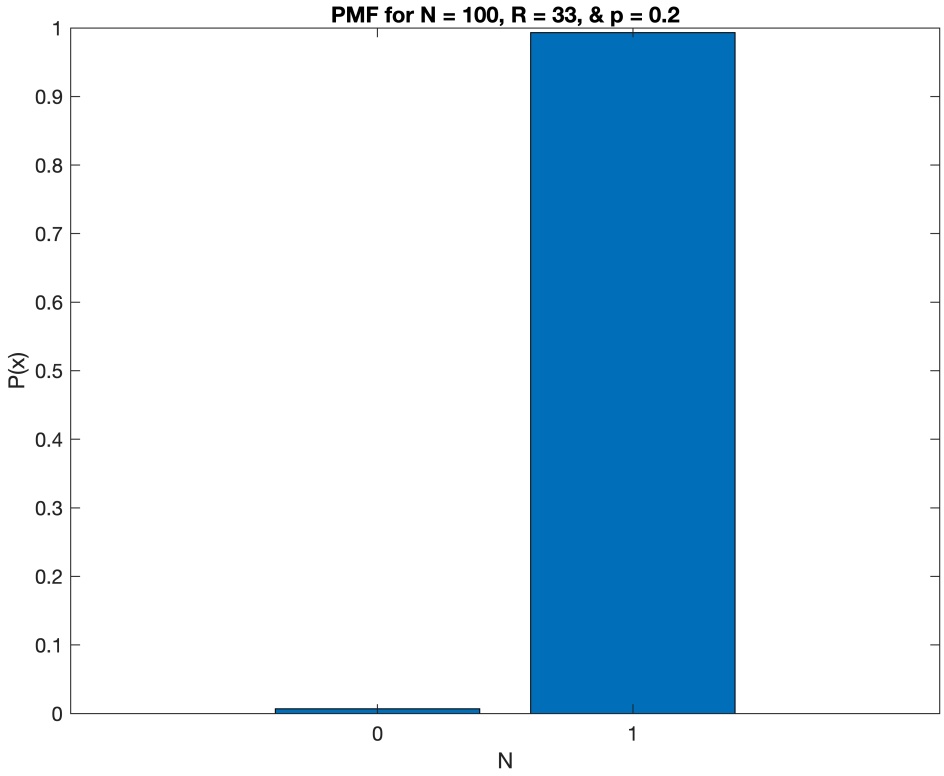



```
The percentage of successes is: 90.3%
ans = 0.9030
```

To ensure that $p_{\text{success}} \geq 0.9$ The minimum R that we should choose is 22

5.

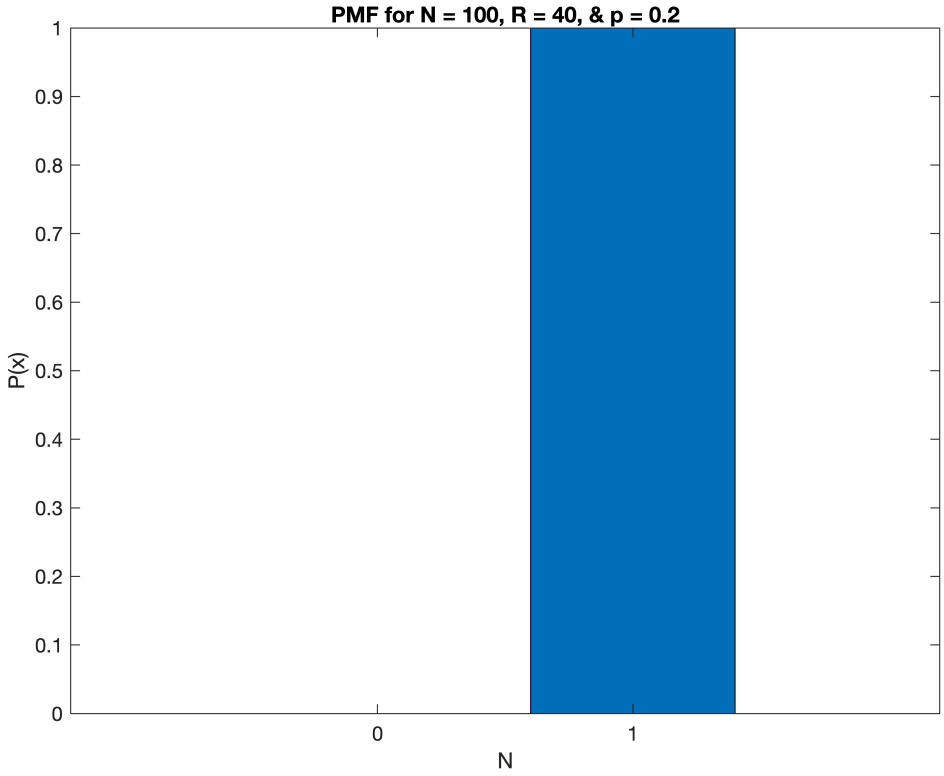
```
Part_2(100, 33, 0.2)
```




```
The percentage of successes is: 99.3%
ans = 0.9930
```

To ensure that $p_{\text{success}} \geq 0.99$ The minimum R that we should choose is 30

```
Part_2(100, 40, 0.2)
```




```
The percentage of successes is: 100%
ans = 1
```

To ensure that $p_{\text{success}} \geq 0.999$ The minimum R that we should choose is 40

6.

p_{success} changes as a function of N, R, P in the following manner. When the length and probability of flips is kept the same, the percentage value of p_{success} increase, When the value of N changes while the value of R and p remain constant, p_{success} decreases as N increases and increases as N decreases.