9.3 Assignment

In [1]:
```
#Author: Vasanthakumar Kalaikkovan
#Date: 10/25/2021
#Assignment: Calculate Probability of a Model Ensemble
```

In [3]:
```
# importing Libraries
import numpy as np
import scipy
import matplotlib.pyplot as plt
from scipy.stats import binom
```

In [4]:
```
# pmf function
def pmf(k,n,p):
    return binom.pmf(k,n,p)
```

In [5]:
```
#cdf function
def cdf(k,n,p):
    return 1-binom.cdf(k,n,p)
```

In [22]:
```
# Probability Distributions
def probabilityDistribution(noModules,errorRate):
    rValue=list(range(noModules+1))
    dist=[binom.pmf(r,noModules,errorRate) for r in rValue]
    plt.bar(rValue,dist)
    plt.show()
```

1. The ensemble contains 11 independent models, all of which have an error rate of 0.2.

In [6]:
```
NoOfModules=11
ErrorRate=0.2
NoOfFailure=np.ceil(NoOfModules/2)
```

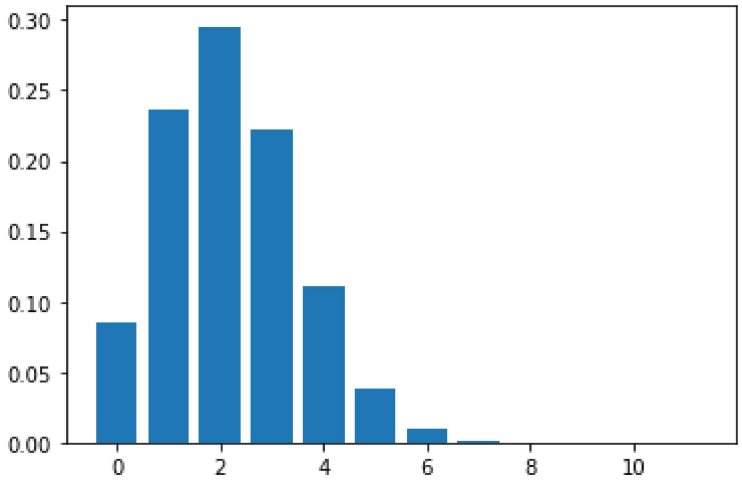
In [7]:
```
pmf(k=NoOfFailure-1,p=ErrorRate,n=NoOfModules)
```

Out[7]: 0.038755368959999995

In [8]:
```
cdf(k=NoOfFailure-1,p=ErrorRate,n=NoOfModules)
```

Out[8]: 0.011654205439999954

In [23]:
```
#probability Distribution
probabilityDistribution(NoOfModules,ErrorRate)
```



2. The ensemble contains 11 independent models, all of which have an error rate of 0.49.

In [24]:
```
NoOfModules=11
ErrorRate=0.49
NoOfFailure=np.ceil(NoOfModules/2)
```

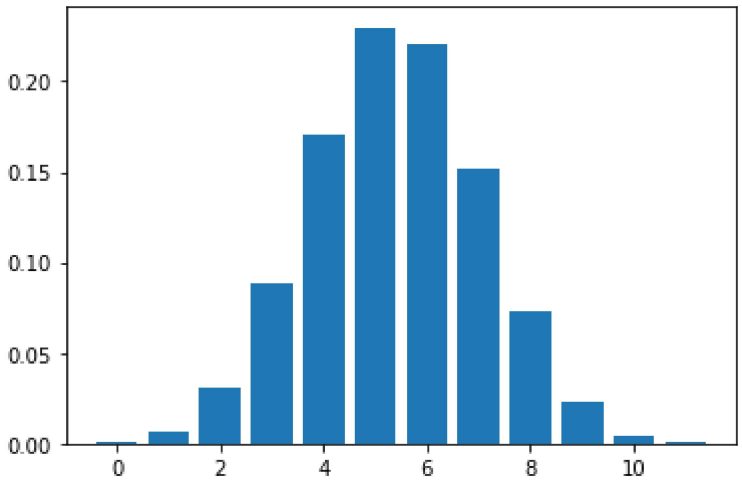
In [25]:
```
pmf(k=NoOfFailure-1,p=ErrorRate,n=NoOfModules)
```

Out[25]: 0.2296378289465168

In [26]:
```
cdf(k=NoOfFailure-1,p=ErrorRate,n=NoOfModules)
```

Out[26]: 0.4729477257149748

In [27]:
```
#probability Distribution
probabilityDistribution(NoOfModules,ErrorRate)
```



3. The ensemble contains 21 independent models, all of which have an error rate of 0.49.

In [28]:
```
NoOfModules=21
```

```
ErrorRate=0.49
NoOfFailure=np.ceil(NoOfModules/2)
```

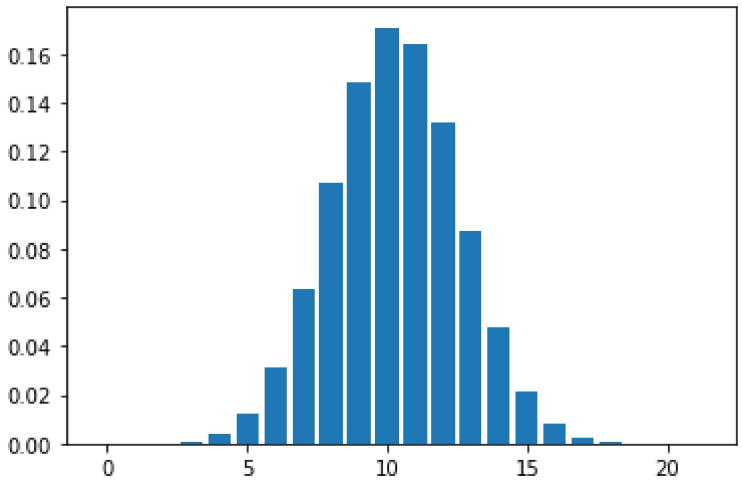
In [29]:
```
pmf(k=NoOfFailure-1,p=ErrorRate,n=NoOfModules)
```

Out[29]: 0.17086688342342418

In [30]:
```
cdf(k=NoOfFailure-1,p=ErrorRate,n=NoOfModules)
```

Out[30]: 0.4630479010127354

In [31]:
```
#probability Distribution
probabilityDistribution(NoOfModules,ErrorRate)
```



In [ ]: