MA201_ASSIGNMENT 3

Name: Dipean Dasgupta Date:1/10/2022

STD ID: 202151188

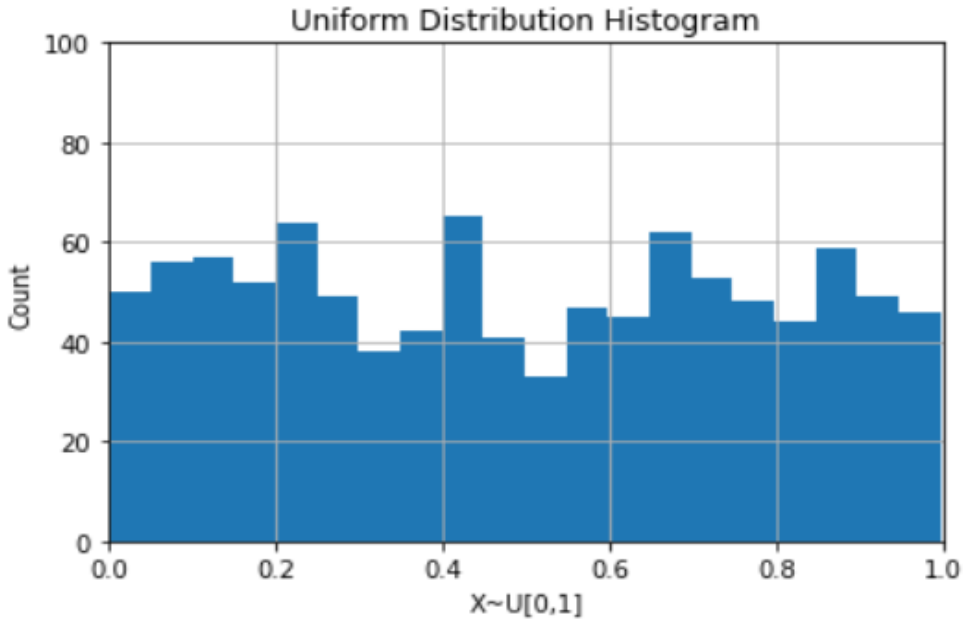
Task: Plot at least five PDFs of special distributions like Gaussian, Uniform, Exponential, and Geometric.

Solution Code:

```
import numpy as np
import matplotlib.pyplot as plt
import random as rd
import scipy.stats as stats
import seaborn as sns
```

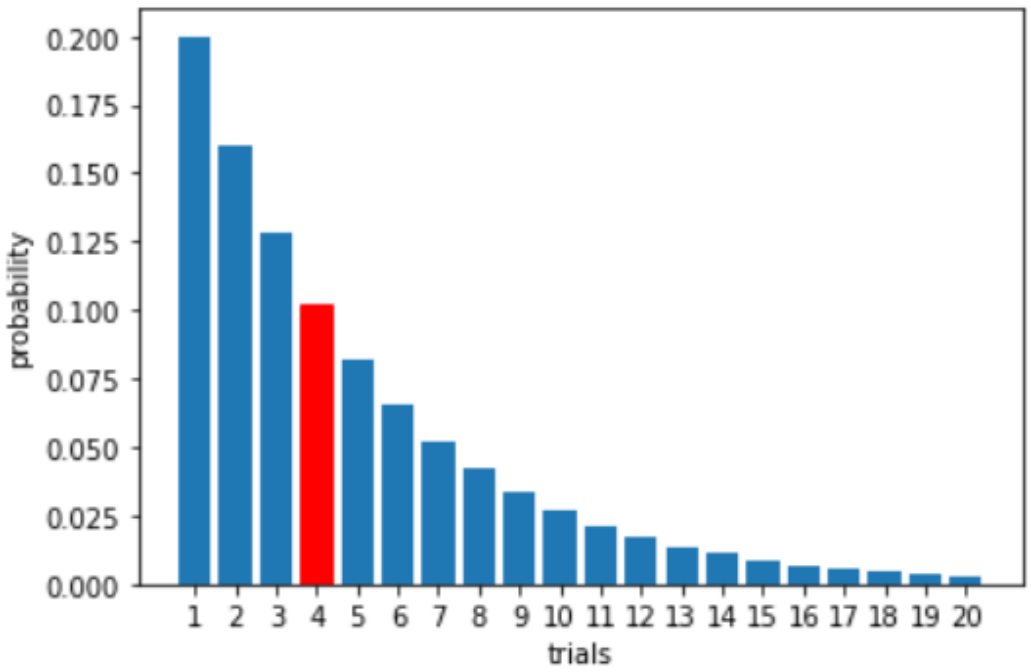
1.Uniform Distribution

```
data = np.random.uniform(0,1,1000)
count, bins,ignored = plt.hist(data, 20,)
plt.xlabel('X~U[0,1]')
plt.ylabel('Count')
plt.title("Uniform Distribution Histogram")
plt.axis([0, 1, 0, 100])
plt.grid(True)
plt.show(block = False)
```



2.Geometric distribution

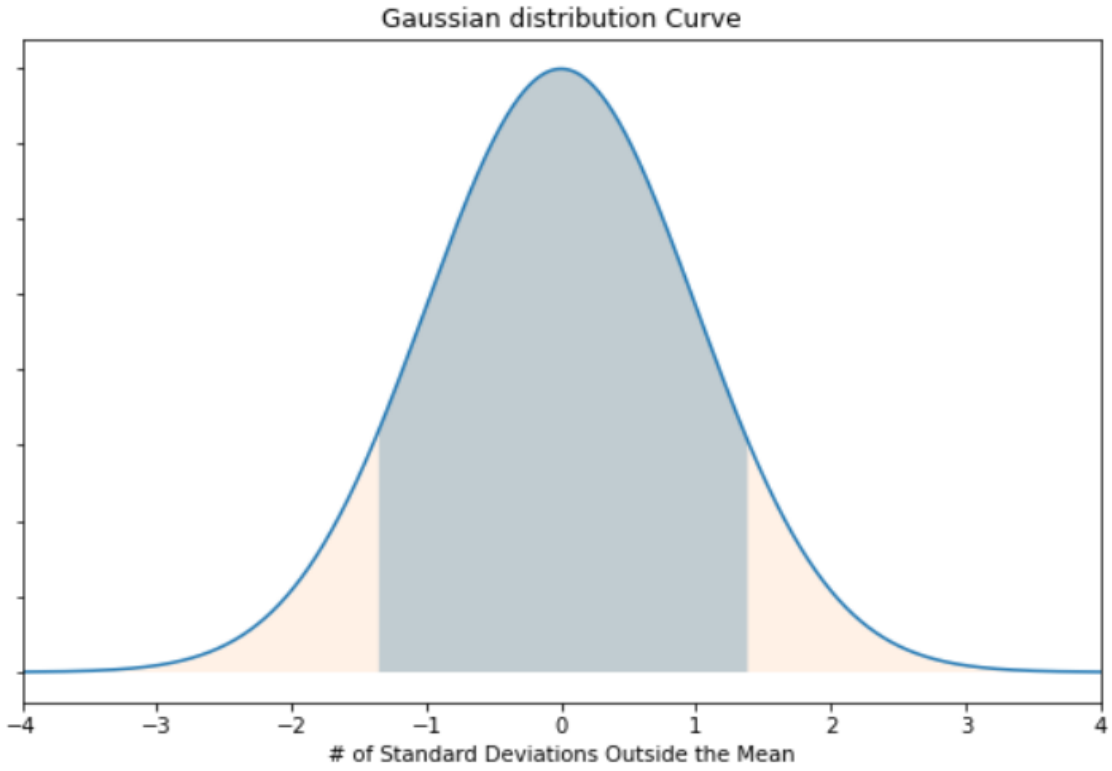
```
def probability_to_occur_at(attempt, probability):
    return (1-p)**(attempt - 1) * probability

p = 0.2
attempt = 3
attempts_to_show = range(21)[1:]
plt.xlabel('trials')
plt.ylabel('probability')
barlist = plt.bar(attempts_to_show, height=[probability_to_occur_at(x, p)
for x in attempts_to_show], tick_label=attempts_to_show)
barlist[attempt].set_color('r')
plt.show()
```



3.Gaussian distribution

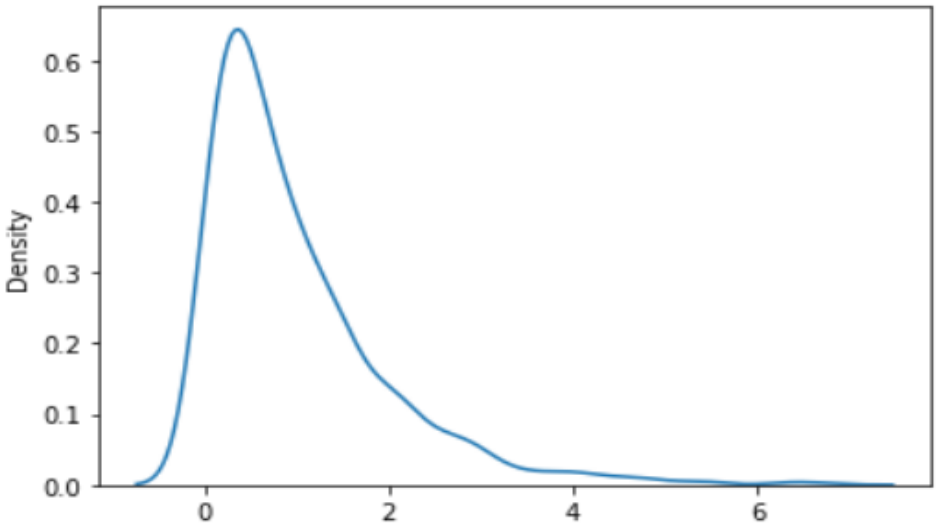
```
from scipy.stats import norm
mu = 998.8
sigma = 73.10
x1 = 900
x2 = 1100
z1 = ( x1 - mu ) / sigma
z2 = ( x2 - mu ) / sigma  #ztransform calculate
x = np.arange(z1, z2, 0.001)
x_all = np.arange(-10, 10, 0.001)
```

```
y = norm.pdf(x,0,1)
y2 = norm.pdf(x_all,0,1)

fig, ax = plt.subplots(figsize=(9,6))
ax.plot(x_all,y2)

ax.fill_between(x,y,0, alpha=0.3)
ax.fill_between(x_all,y2,0, alpha=0.1)
ax.set_xlim([-4,4])
ax.set_xlabel('# of Standard Deviations Outside the Mean')
ax.set_yticklabels([])
ax.set_title('Gaussian distribution Curve')
plt.show()
```



4.Exponential Distribution

```
from numpy import random
x = random.exponential(scale=2, size=(2, 3))
sns.distplot(random.exponential(size=1000), hist=False)
plt.show()
```



5.Gamma distribution

```
x = np.linspace (0, 40, 100)
y = stats.gamma.pdf(x, a=5, scale=3)
plt.plot(x, y)
plt.show()
```