Lab No 1

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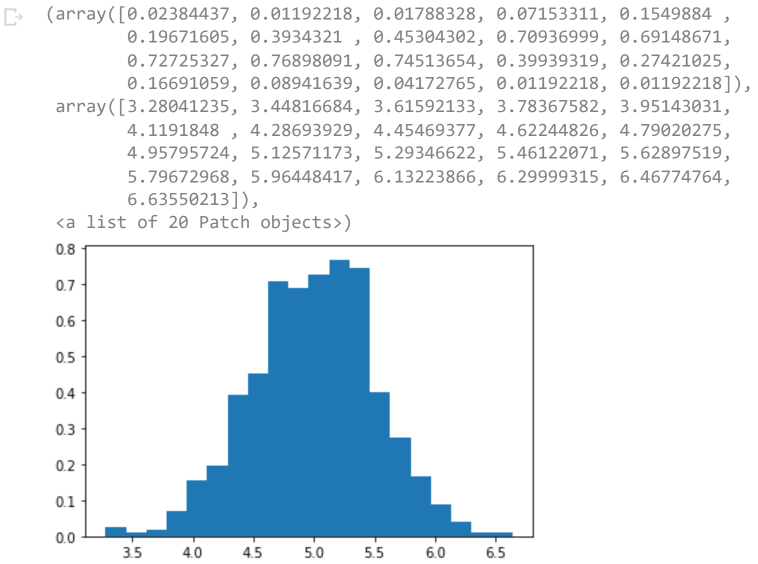
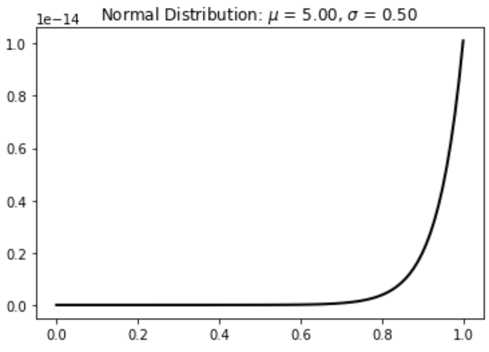
2020802124

```
# Performing Normal, Binomial, and Poisson Distributions on random Data

import numpy as np
import matplotlib.pyplot as plt
import scipy.stats as stats

# Normal Distribution
# Generate 1000 random numbers from a normal distribution with mean 5 and standard deviation 0.5
data = stats.norm.rvs(loc=5, scale=0.5, size=1000)

# Plot the histogram
plt.hist(data, bins=20, density=True)
```



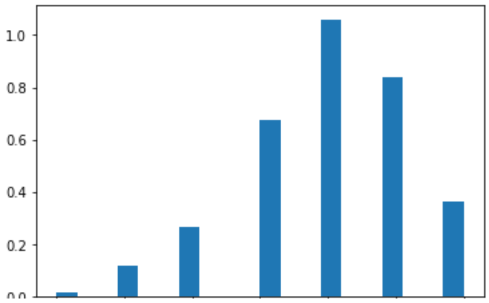
```
(array([0.02384437, 0.01192218, 0.01788328, 0.07153311, 0.1549884 ,
        0.19671605, 0.3934321 , 0.45304302, 0.70936999, 0.69148671,
        0.72725327, 0.76898091, 0.74513654, 0.39939319, 0.27421025,
        0.16691059, 0.08941639, 0.04172765, 0.01192218, 0.01192218]),
 array([3.28041235, 3.44816684, 3.61592133, 3.78367582, 3.95143031,
        4.1191848 , 4.28693929, 4.45469377, 4.62244826, 4.79020275,
        4.95795724, 5.12571173, 5.29346622, 5.46122071, 5.62897519,
        5.79672968, 5.96448417, 6.13223866, 6.29999315, 6.46774764,
        6.63550213]),
 <a list of 20 Patch objects>)
```

```
# Plot the PDF
xmin, xmax = plt.xlim()
x = np.linspace(xmin, xmax, 100)
p = stats.norm.pdf(x, loc=5, scale=0.5)
plt.plot(x, p, 'k', linewidth=2)
title = "Normal Distribution: $\mu$ = %.2f, $\sigma$ = %.2f" % (5, 0.5)
plt.title(title)
plt.show()
```

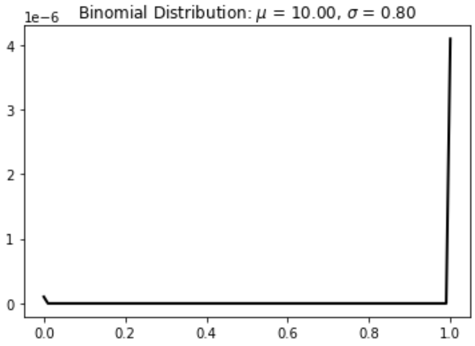


```
# Binomial Distribution
# Generate 1000 random numbers from a binomial distribution with n=10 and p=0.8
data2 = stats.binom.rvs(n=10, p=0.8, size=1000)

# Plot the histogram
plt.hist(data2, bins=20, density=True)
```

```
(array([0.01333333, 0.        , 0.        , 0.11666667, 0.        ,
        0.        , 0.26666667, 0.        , 0.        , 0.        ,
        0.67333333, 0.        , 0.        , 1.06      , 0.        ,
        0.        , 0.84      , 0.        , 0.        , 0.36333333]),
 array([ 4. ,  4.3,  4.6,  4.9,  5.2,  5.5,  5.8,  6.1,  6.4,  6.7,  7. ,
         7.3,  7.6,  7.9,  8.2,  8.5,  8.8,  9.1,  9.4,  9.7, 10. ]),
 <a list of 20 Patch objects>)
```

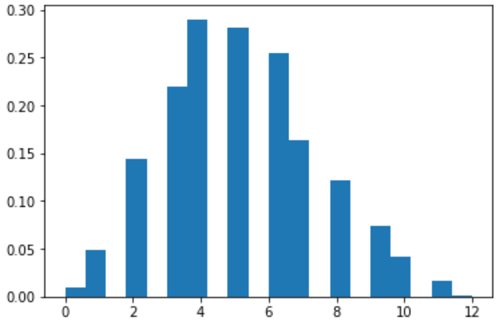


```
# Plot the PDF
xmin, xmax = plt.xlim()
x = np.linspace(xmin, xmax, 100)
p = stats.binom.pmf(x, n=10, p=0.8)
plt.plot(x, p, 'k', linewidth=2)
title = "Binomial Distribution: $\mu$ = %.2f, $\sigma$ = %.2f" % (10, 0.8)
plt.title(title)
plt.show()
```

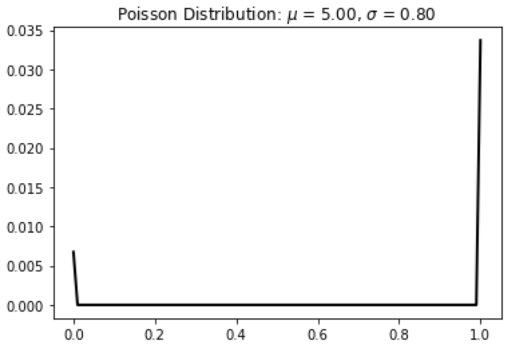


```
# Poisson Distribution
# Generate 1000 random numbers from a poisson distribution with lambda=5
data3 = stats.poisson.rvs(mu=5, size=1000)

# Plot the histogram
plt.hist(data3, bins=20, density=True)
```

```
(array([0.01      , 0.04833333, 0.        , 0.14333333, 0.        ,
        0.22      , 0.29      , 0.        , 0.28166667, 0.        ,
        0.255     , 0.16333333, 0.        , 0.12166667, 0.        ,
        0.07333333, 0.04166667, 0.        , 0.01666667, 0.00166667]),
 array([ 0. ,  0.6,  1.2,  1.8,  2.4,  3. ,  3.6,  4.2,  4.8,  5.4,  6. ,
         6.6,  7.2,  7.8,  8.4,  9. ,  9.6, 10.2, 10.8, 11.4, 12. ]),
 <a list of 20 Patch objects>)
```



```
# Plot the PDF
xmin, xmax = plt.xlim()
x = np.linspace(xmin, xmax, 100)
p = stats.poisson.pmf(x, mu=5)
plt.plot(x, p, 'k', linewidth=2)
title = "Poisson Distribution: $\mu$ = %.2f, $\sigma$ = %.2f" % (5, 0.8)
plt.title(title)
plt.show()
```



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