assignment1

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1.1 Chapter 2

1.1.1 2.1

The probability density is given by taking each value and dividing by the number of experiments conducted, N, where $N = 175$. The mean and standard deviation are: $\mu = \langle \Lambda \rangle = 0.449$, $\sigma = 0.204$. The mean of the square value is: $\langle \Lambda^2 \rangle = 0.243$.

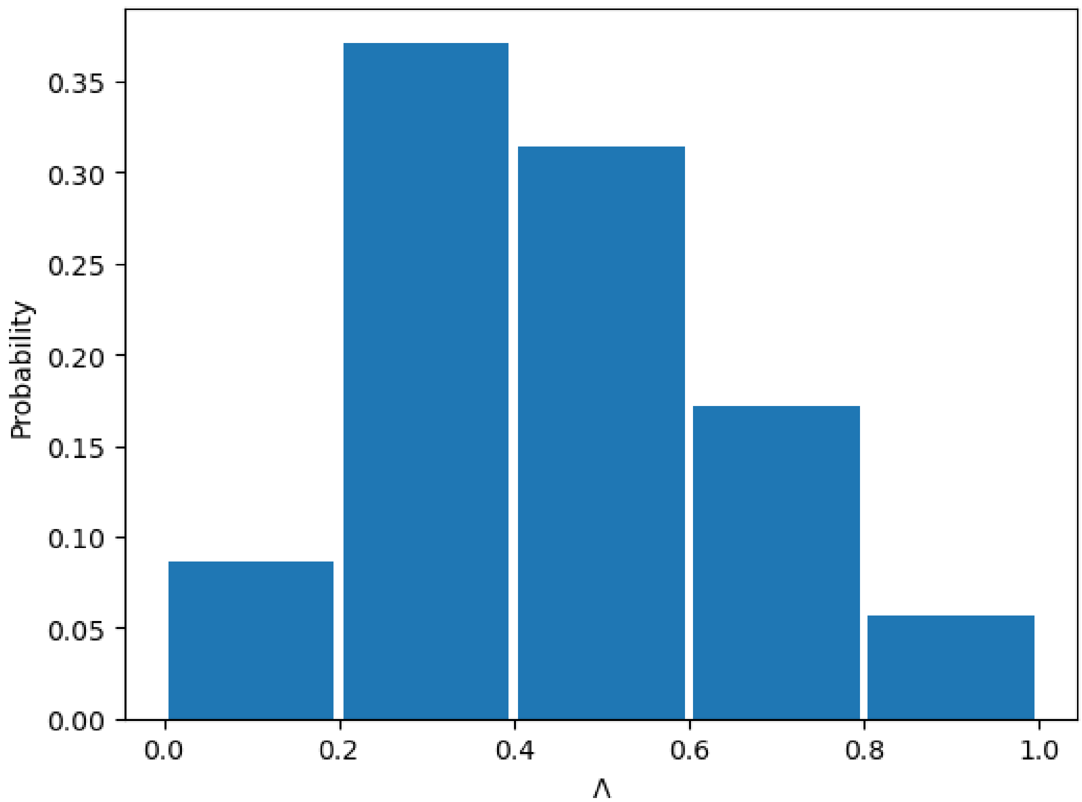
The PDF table:

Λ	$P(\Lambda)$
0.0-0.2	0.08571429
0.2-0.4	0.37142857
0.4-0.6	0.31428571
0.6-0.8	0.17142857
0.8-1.0	0.05714286

[ ]:
```
import matplotlib.pyplot as plt
import numpy as np
import scipy.stats as stats

fig = plt.figure()
ax1 = fig.add_subplot(111)
y = np.array([15, 65, 55, 30, 10])
x = np.arange(0.1, 1, .2)
N = np.sum(y)

mean = np.sum(x * y) / N
mean2 = np.sum(y * (x) ** 2) / N
std = np.sqrt(np.sum(y * np.power(x - mean, 2)) / N)

ax1.bar(x, y / N, width=0.19)

# x_norm = np.arange(0.0, 1, .05)
# ax1.plot(x_norm, stats.norm.pdf(x_norm, mean, std))
ax1.set_ylabel("Probability")
```

```
ax1.set_xlabel(r"$\Lambda$")

print(N)
print(mean, mean2, std)
```

```
175
0.4485714285714287 0.24314285714285722 0.20475968991050192
```



1.1.2 2.2

[ ]:
```
volume = lambda r: 4/3 * np.pi * np.power(r, 3)
density = 1.0e3 # kg / m^3
r = 1e-6
mass = volume(r) * density

k_b = 1.380649e-23
ke = lambda T: 3*k_b*T/2

print(f"mass is {mass} and rms is {ke(295)}")
```

```
mass is 4.1887902047863906e-15 and rms is 6.109371825e-21
```