cheg304 homework4 question4

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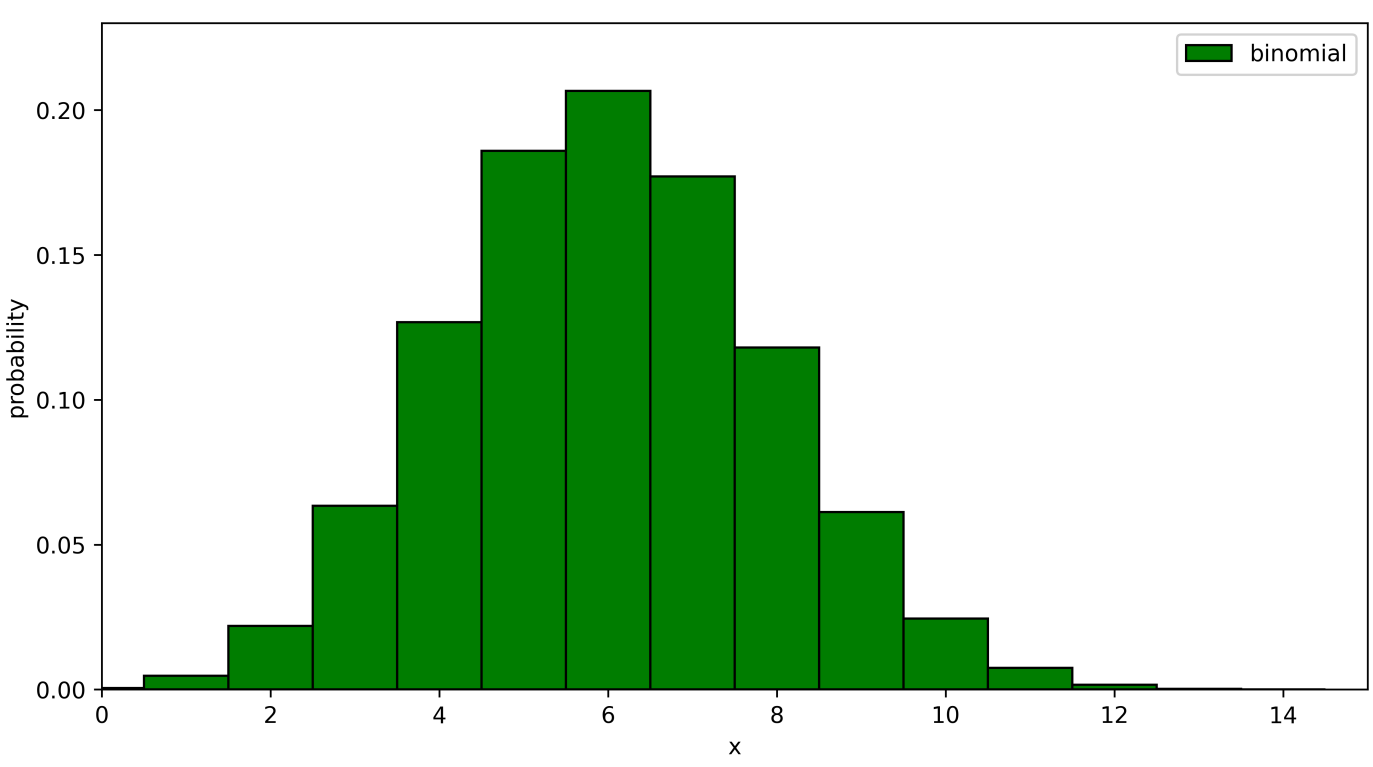
▼ Code

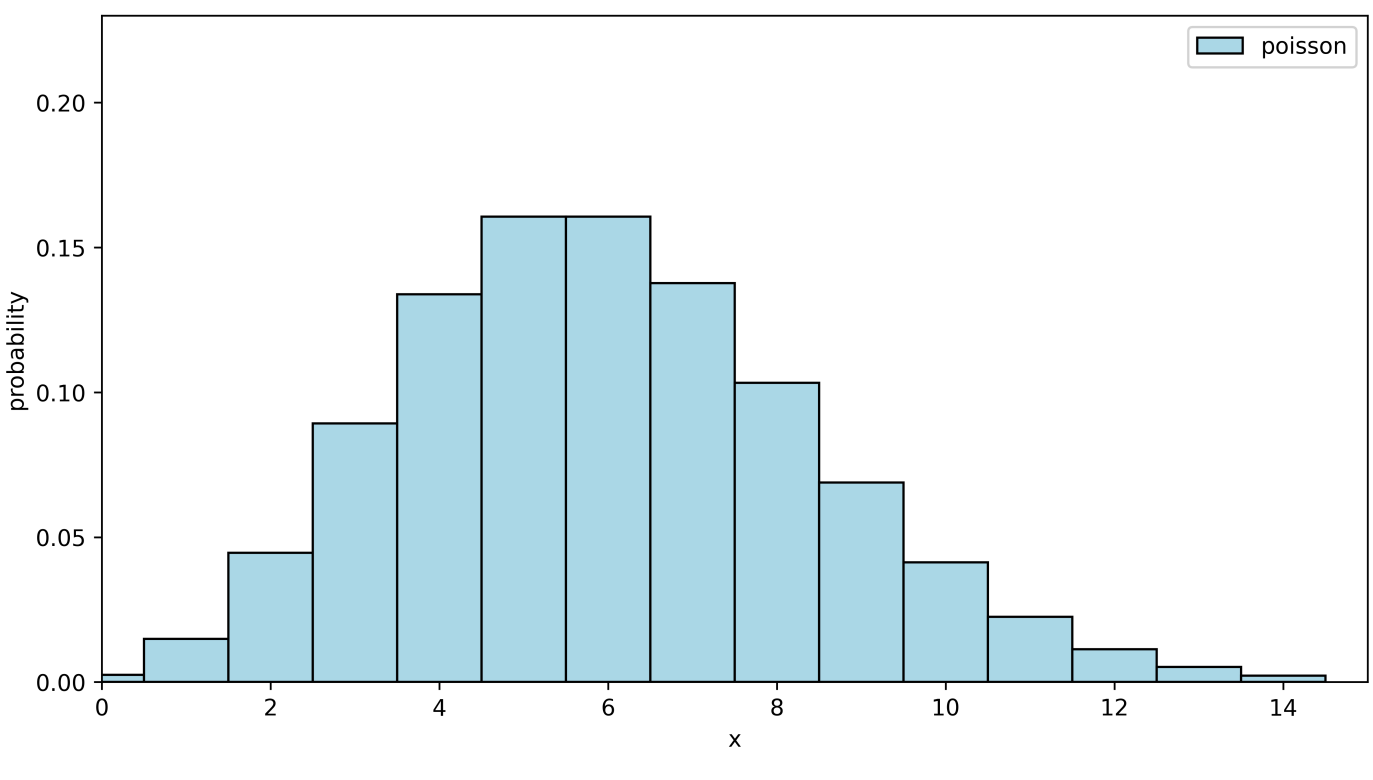
```
import numpy as np
from scipy.stats import norm, poisson, binom
import matplotlib.pyplot as plt
```

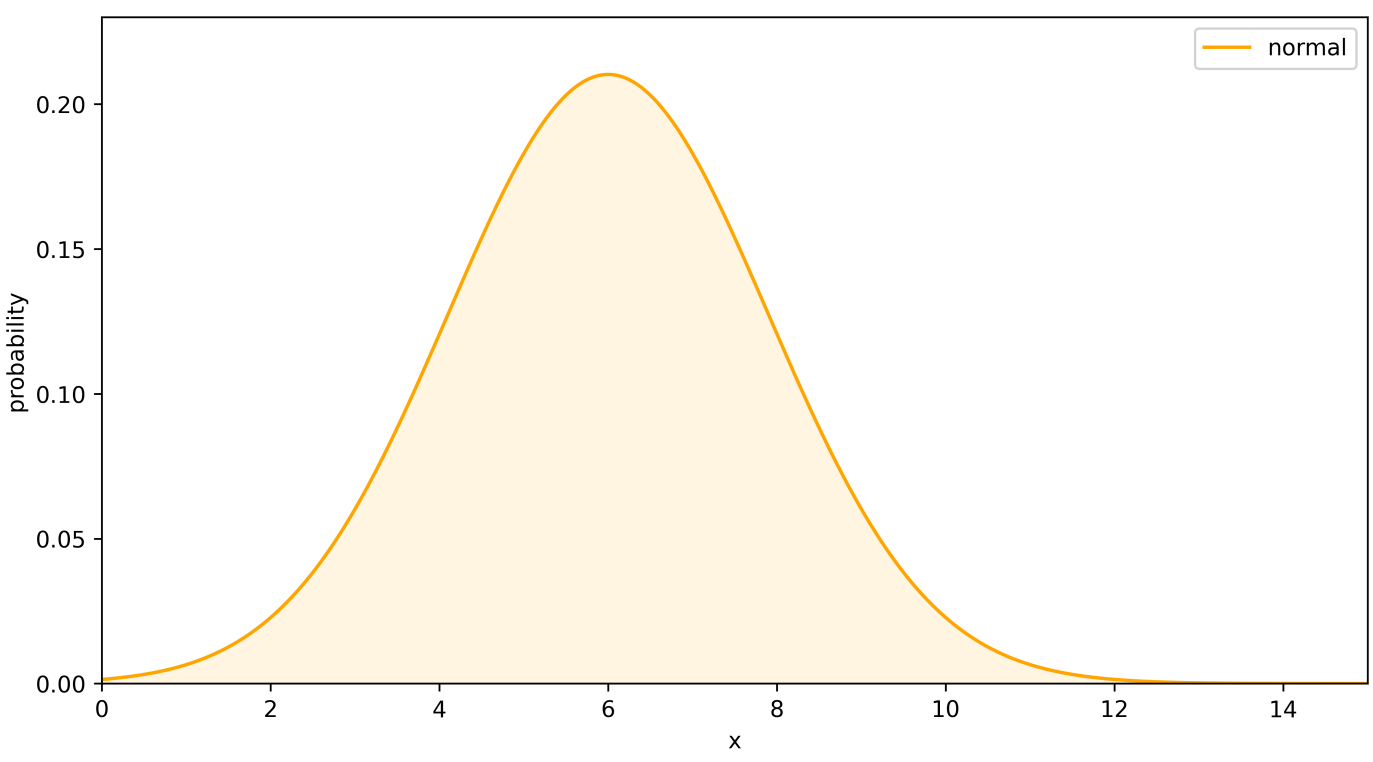
1. The histogram of the binomial distribution for $n = 15$ and $p = 0.4$
2. The histogram of the Poisson distribution for the appropriate equivalent $\lambda = np$
3. The continuous plot of the normal distribution for the appropriate equivalent mean and standard deviation ($\mu = \text{mean}; \sigma = \sqrt{npq}$)

▼ Code

```
fig, (ax_binom, ax_poisson, ax_normal) = plt.subplots(3,1, figsize=(10,18), dpi=600, subp

n = 15
p = 0.4
x = np.arange(0,15)
x_continuous = np.linspace(0,15,1000)

ax_binom.bar(x, binom.pmf(x, n=n, p=p), width=1, edgecolor='black', facecolor='green')
ax_poisson.bar(x, poisson.pmf(x, n*p), width=1, edgecolor='black', facecolor='lightblue')
ax_normal.plot(x_continuous, norm.pdf(x_continuous, n*p, np.sqrt(n*p*(1-p))), c='orange')
ax_normal.fill_between(x_continuous, norm.pdf(x_continuous, n*p, np.sqrt(n*p*(1-p))), col

ax_binom.legend(['binomial'])
ax_poisson.legend(['poisson'])
ax_normal.legend(['normal']);
```







monte carlo

▼ Code

```
def monte_carlo(p, size):
    return sum(np.random.rand(size) < p)

def batch_monte_carlo(p, size, batch_size):
    results = [monte_carlo(p, size) for i in range(batch_size)]
    return np.array(results)

simulated = batch_monte_carlo(0.4, 15, 1000)
fig,ax = plt.subplots(figsize=(10,7), dpi=600)
ax.hist(simulated, density=True, edgecolor='black');
ax.set(xlim=(0,15), ylabel='relative frequency', xlabel='number of successes', ylim=(0,0.
```


▼ Code

```
# filler text
```