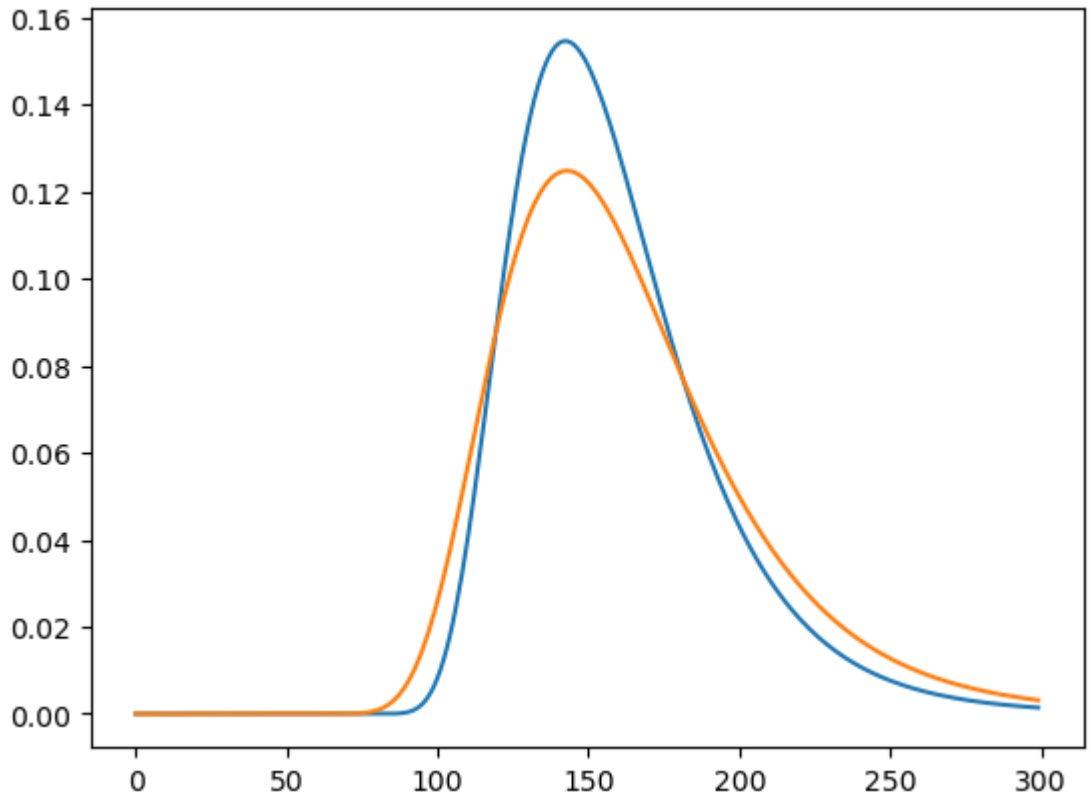
Likelyhood calculations and plots for question 3

In [ ]:
```
def L(n):
    if n<76: return 0
    return binomial(40,14)*binomial(n-40,36)/binomial(n,50)

def L_rep(n):
    if n<40: return 0
    return binomial(50,14)* (40/n)**14 * (1-40/n)**36
```

In [2]:
```
plot([L(n) for n in range(300)],[L_rep(n) for n in range(300)])
```



Blue: Likelyhood; Orange: Likelyhood wiith repetition.Note that (unlike probabilities), the likelyhoods do not add up to 1.

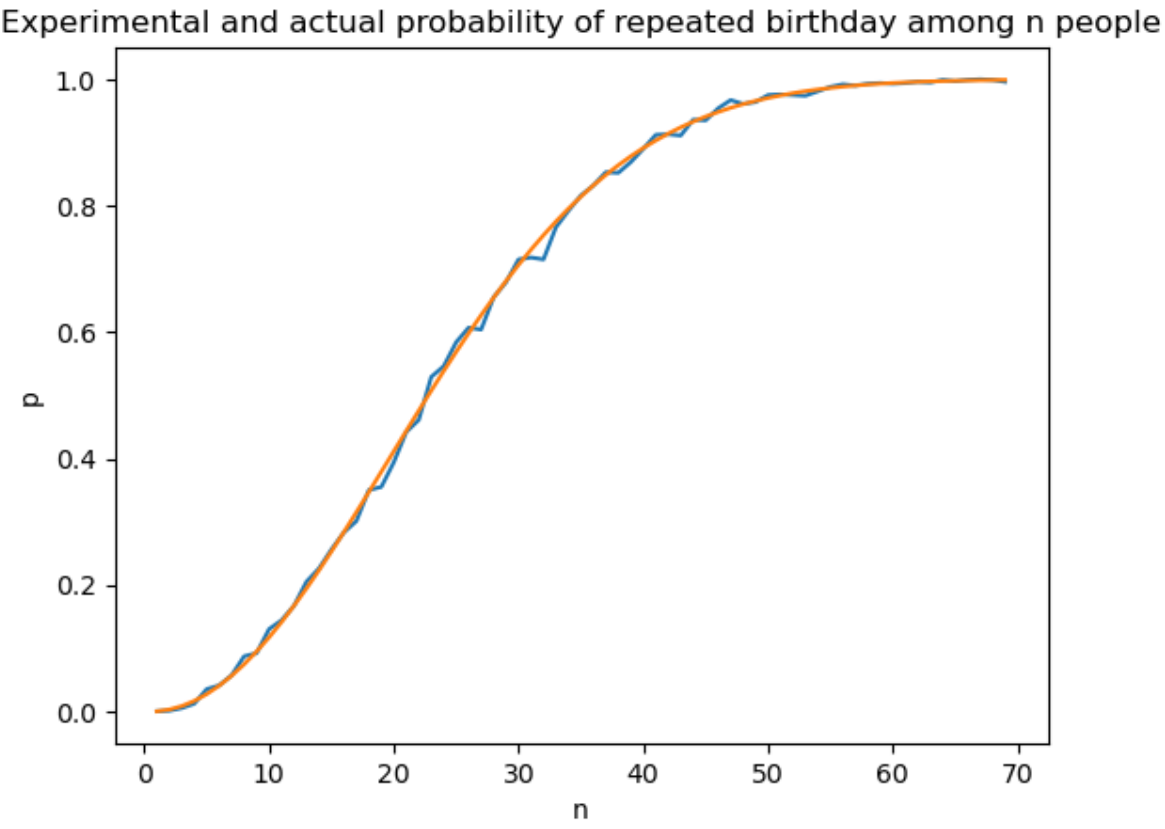
Problem 6

In [ ]:
```
def birthday_repeat(n,days_in_year=365):
    A = [randrange(days_in_year) for i in range(n)]
    #sets contain each element only once.
    return len(set(A)) < len(A)

def birthday_sample(n_people,n_tests,days_in_year=365):
    return sum(birthday_repeat(n_people,days_in_year) for i in range(n_tests

def repeat_prob(n,days_in_year=365):
    return 1 - factorial(days_in_year) / factorial(days_in_year-n) / days_in
```

In [ ]:
```
X = range(1,70)
Y = [birthday_sample(n,1000) for n in X]
Z = [repeat_prob(n) for n in X]
```

In [10]:
```
plt.figure()
plt.plot(X,Y)
plt.plot(X,Z)
plt.xlabel('n')
plt.ylabel('p')
plt.title('Experimental and actual probability of repeated birthday among n
```

Out[10]:
```
Text(0.5, 1.0, 'Experimental and actual probability of repeated birthday am
ong n people')
```



In [11]:
```
X = range(1,70)
Y_mars = [birthday_sample(n,1000,669) for n in X]
Z_mars = [repeat_prob(n,669) for n in X]
```

In [12]:
```
plt.figure()
plt.plot(X,Y_mars)
plt.plot(X,Z_mars)
plt.xlabel('n')
plt.ylabel('p')
plt.title('Experimental and actual probability of repeated birthday among n
```

Out[12]:
```
Text(0.5, 1.0, 'Experimental and actual probability of repeated birthday am
ong n Martians')
```