Problem Statement - Poisson Distribution

If on an average, 6 customers arrive every one minute at a bank during the busy hours of working, a) what is the probability that exactly four customers arrive in a given minute? b) What is the probability that more than three customers will arrive in a given minute?

Work out using Python

In [1]:
```
import numpy as np
import scipy.stats as stats
import matplotlib.pyplot as plt
```

In [2]:
```
rate = 6
```

In [3]:
```
n = np.arange(0,20)
```

In [4]:
```
poisson = stats.poisson.pmf(n,rate)
```

In [5]:
```
poisson
```

Out[5]:
```
array([2.47875218e-03, 1.48725131e-02, 4.46175392e-02, 8.92350784e-02,
       1.33852618e-01, 1.60623141e-01, 1.60623141e-01, 1.37676978e-01,
       1.03257734e-01, 6.88384890e-02, 4.13030934e-02, 2.25289600e-02,
       1.12644800e-02, 5.19899078e-03, 2.22813891e-03, 8.91255562e-04,
       3.34220836e-04, 1.17960295e-04, 3.93200983e-05, 1.24168732e-05])
```

a) what is the probability that exactly four customers arrive in a given minute?

In [6]:
```
poisson[4]
```

Out[6]:
```
0.13385261753998332
```

The probability that exactly four customers arrive in a given minute is 13.4 %

b) What is the probability that more than three customers will arrive in a given minute?

In [7]:
```
1 - (poisson[0] + poisson[1] + poisson[2] + poisson[3])
```

Out[7]:
```
0.8487961172233521
```

The probability that more than three customers will arrive in a given minute is 84.88 %

In [8]:
```
#
```

In [9]:
```
#
```

In [10]:
```
#
```

Poisson Distribution Example - Laptop Defects Analysis

Problem Statement - Poisson Distribution

A Laptop Assembly unit is permorning a Defects Analysis, to understand the number of defects that could happen for a given defective laptop. It is noted from past quality & audit data that 12 defects are noticed on an average for a defective Laptop, calculate

Probability that a defective laptop has exactly 5 defects Probability that a defective laptop has less than 5 defects Work out using Python

In [11]:
```
import numpy as np
import scipy.stats as stats
import matplotlib.pyplot as plt
```

In [12]:
```
rate = 12
```

In [13]:
```
n = np.arange(0,30)
```

In [14]:
```
poisson = stats.poisson.pmf(n,rate)
```

In [15]:
```
poisson
```

Out[15]:
```
array([6.14421235e-06, 7.37305482e-05, 4.42383289e-04, 1.76953316e-03,
       5.30859947e-03, 1.27406387e-02, 2.54812775e-02, 4.36821900e-02,
       6.55232849e-02, 8.73643799e-02, 1.04837256e-01, 1.14367916e-01,
       1.14367916e-01, 1.05570384e-01, 9.04889002e-02, 7.23911201e-02,
       5.42933401e-02, 3.83247107e-02, 2.55498071e-02, 1.61367203e-02,
       9.68203217e-03, 5.53258981e-03, 3.01777626e-03, 1.57449196e-03,
       7.87245981e-04, 3.77878071e-04, 1.74405263e-04, 7.75134504e-05,
       3.32200502e-05, 1.37462277e-05])
```

In [18]:
```
#Q1 . Probability that a defective laptop has exactly 5 defects
```

In [16]:
```
poisson[5]
```

Out[16]:
```
0.012740638735861376
```

In [17]:
```
0.012740638735861376 * 100
```

Out[17]:
```
1.2740638735861376
```

In [19]:
```
# Q2. robability that a defective laptop has less than 5 defects
```

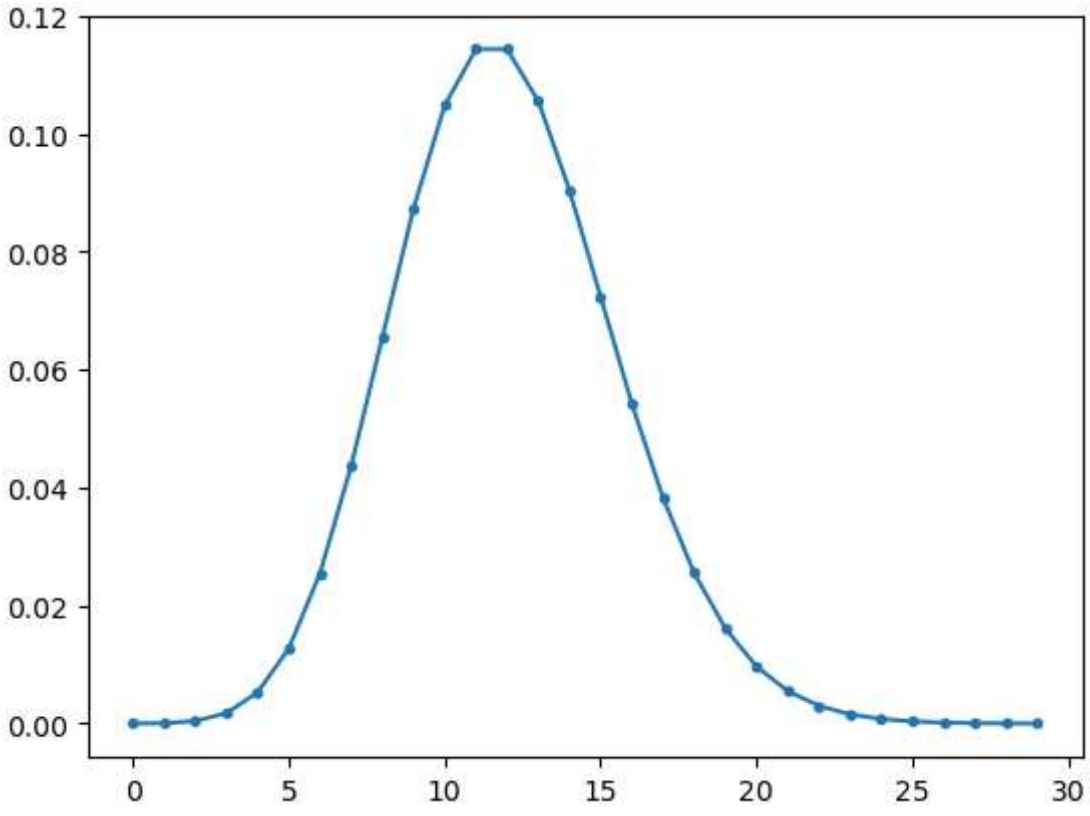
In [20]:
```
poisson[0] + poisson[1] + poisson[2] + poisson[3] + poisson[4]
```

Out[20]:
```
0.007600390681067
```

In [21]:
```
0.007600390681067 * 100
```

Out[21]:
```
0.7600390681067
```

In [22]:
```
plt.plot(n,poisson, '.-')
plt.show()
```



In [ ]:
```

```