Discrete Distribution

A discrete probability distribution is the probability distribution of a random variable that can take on only a countable number of values. In the case where the range of values is countably infinite, these values have to decline to zero fast enough for the probabilities to add up to 1. Well-known discrete probability distributions used in statistical modeling include the Poisson distribution, the Bernoulli distribution, the binomial distribution, the geometric distribution, and the negative binomial distribution. Additionally, the discrete uniform distribution is commonly used in computer programs that make equal-probability random selections between a number of choices

In [1]:
```
import matplotlib.pyplot as plt
from IPython.display import Math , Latex
from IPython.core.display import Image
import numpy as np
import seaborn as sms
print('all are imported')
```

```
all are imported
```

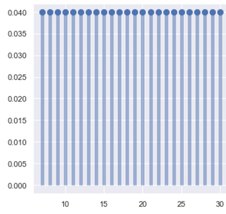
In [2]:
```
sms.set(color_codes=True)
sms.set(rc={'figure.figsize':(5,5)})
```

Uniform Distribution

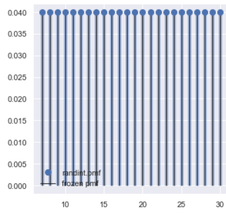
In probability theory and statistics, the discrete uniform distribution is a symmetric probability distribution wherein a finite number of values are equally likely to be observed; every one of n values has equal probability. Another way of saying "discrete uniform distribution" would be "a known, finite number of outcomes equally likely to happen"

In [3]:
```
from scipy.stats import randint
import matplotlib.pyplot as plt
fig,ax=plt.subplots(1,1)
low, high = 7,32
mean, var,skew,kurt = randint.stats(low,high,moments='mvsk')
x = np.arange(randint.ppf(0.01,low,high),
              randint.ppf(0.99,low,high))
ax.plot(x,randint.pmf(x,low,high),'bo',ms=8,label='randint.pmf')
ax.vlines(x,0,randint.pmf(x,low,high),colors='b',lw=5,alpha=0.5)
```

Out[3]:
```
<matplotlib.collections.LineCollection at 0x5a01a90>
```



In [4]:
```
from scipy.stats import randint
import matplotlib.pyplot as plt
fig,ax=plt.subplots(1,1)
low, high = 7,32
mean, var,skew,kurt = randint.stats(low,high,moments='mvsk')
x = np.arange(randint.ppf(0.01,low,high),
              randint.ppf(0.99,low,high))
ax.plot(x,randint.pmf(x,low,high),'bo',ms=8,label='randint.pmf')
ax.vlines(x,0,randint.pmf(x,low,high),colors='b',lw=5,alpha=0.5)
rv=randint(low,high)
ax.vlines(x,0,rv.pmf(x),colors='k',linestyles='-',lw=1,label='frozen pmf')
ax.legend(loc='best',frameon=False)
plt.show()
prob=randint.cdf(x,low,high)
np.allclose(x,randint.ppf(prob,low,high))
r=randint.rvs(low,high,size=1000)
```

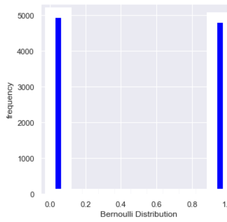


Bernoulli Distribution

In probability theory and statistics, the Bernoulli distribution, named after Swiss mathematician Jacob Bernoulli, is the discrete probability distribution of a random variable which takes the value 1 with probability p and the value 0 with probability q = 1 - p. Less formally, it can be thought of as a model for the set of possible outcomes of any single experiment that asks a yes–no question.

In [7]:
```
from scipy.stats import bernoulli
data_bern=bernoulli.rvs(size=10000,p=0.5)
ax=sms.distplot(data_bern,kde=False,color='blue',hist_kws={"linewidth":15,'alpha':1})
ax.set(xlabel='Bernoulli Distribution',ylabel='frequency')
```

Out[7]:
```
[Text(0.5, 0, 'Bernoulli Distribution'), Text(0, 0.5, 'frequency')]
```

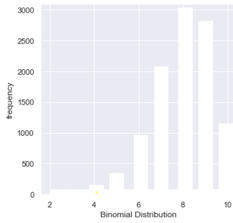


Binomial Distribution

In probability theory and statistics, the binomial distribution with parameters n and p is the discrete probability distribution of the number of successes in a sequence of n independent experiments, each asking a yes–no question, and each with its own Boolean-valued outcome: success (with probability p) or failure (with probability q = 1 − p). A single success/failure experiment is also called a Bernoulli trial or Bernoulli experiment, and a sequence of outcomes is called a Bernoulli process; for a single trial, i.e., n = 1, the binomial distribution is a Bernoulli distribution.

In [8]:
```
from scipy.stats import binom
data_binom=binom.rvs(size=10000,p=0.8,n=10)
ax=sms.distplot(data_binom,kde=False,color='Yellow',hist_kws={"linewidth":15,'alpha':1})
ax.set(xlabel='Binomial Distribution',ylabel='frequency')
```

Out[8]:
```
[Text(0.5, 0, 'Binomial Distribution'), Text(0, 0.5, 'frequency')]
```

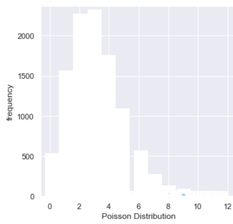


Poisson Distribution

In probability theory and statistics, the Poisson distribution, named after French mathematician Siméon Denis Poisson, is a discrete probability distribution that expresses the probability of a given number of events occurring in a fixed interval of time or space if these events occur with a known constant mean rate and independently of the time since the last event

In [9]:
```
from scipy.stats import poisson
data_poisson=poisson.rvs(size=10000,mu=3)
ax=sms.distplot(data_poisson,kde=False,color='skyblue',hist_kws={"linewidth":15,'alpha':1})
ax.set(xlabel='Poisson Distribution',ylabel='frequency')
```

Out[9]:
```
[Text(0.5, 0, 'Poisson Distribution'), Text(0, 0.5, 'frequency')]
```



In [ ]:
```
```