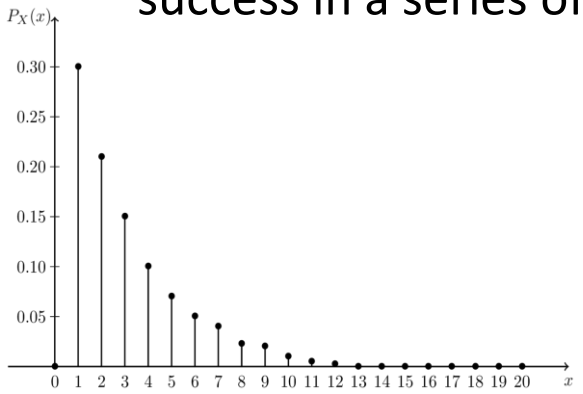
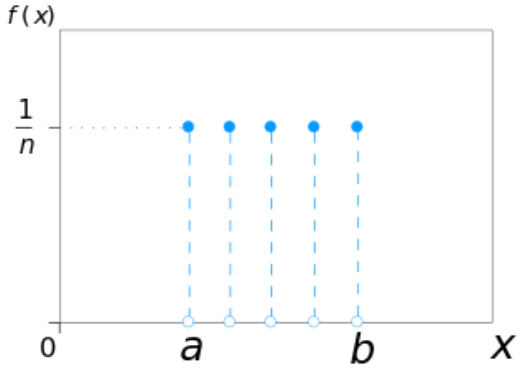
The Distributions

Good times.

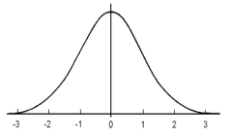
The geometric distribution represents the number of failures before you get a success in a series of Bernoulli trials.



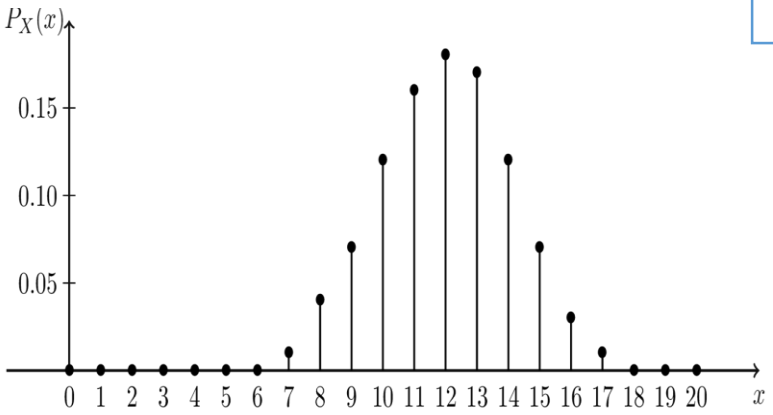
A uniform distribution is a distribution that has constant probability.



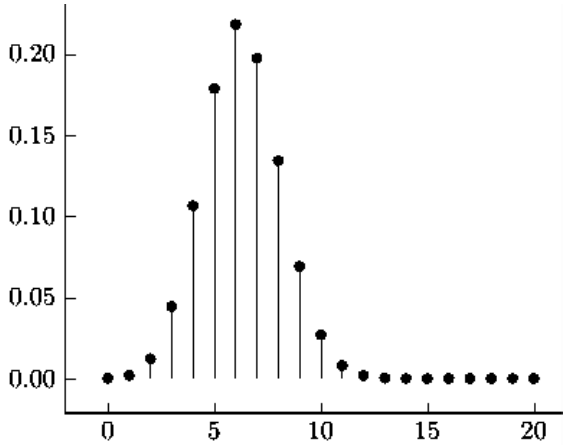
The normal distribution is a very common **continuous** probability distribution often used in the natural and social sciences to represent real-valued random variables.



The binomial distribution gives the **discrete** probability distribution of obtaining exactly x successes out of n Bernoulli trials.



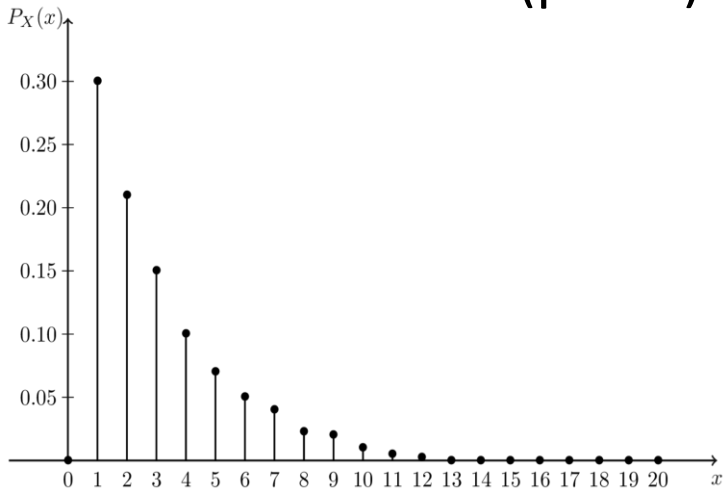
The hypergeometric distribution is a discrete probability distribution that describes the probability of successes in draws, without replacement.



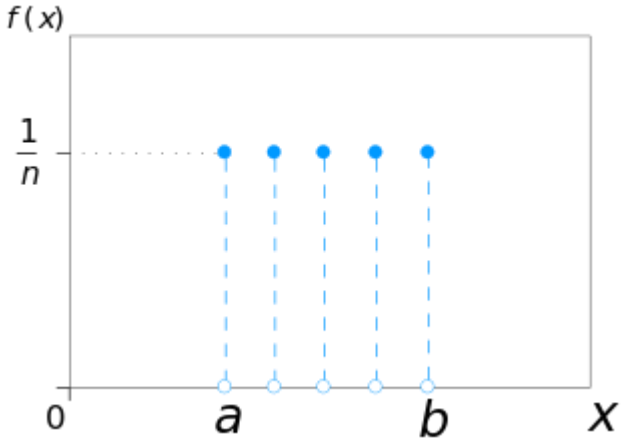
Define each probability distribution.

What is the format of the formula for each distribution?

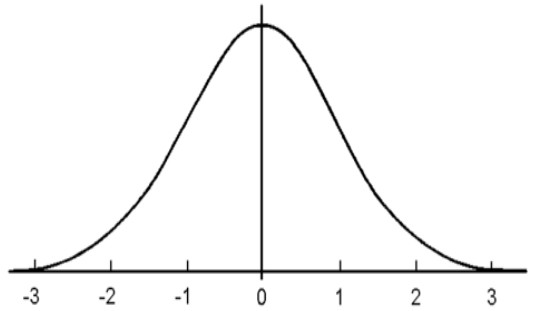
X ~ Geometric(p=0.3)



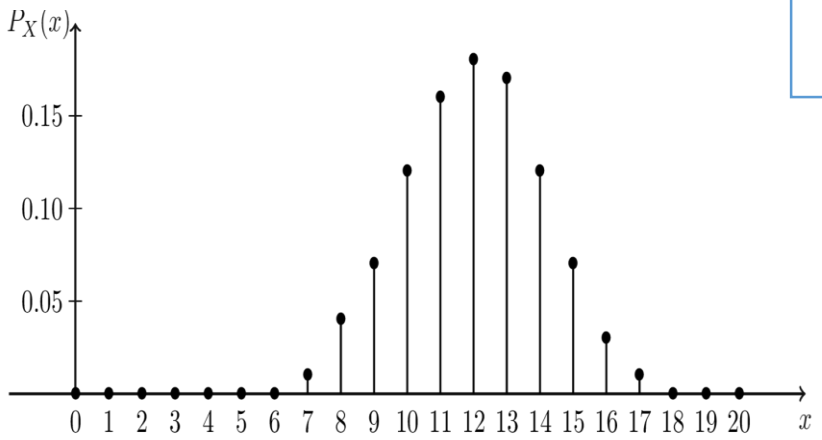
X ~ Uniform (n=5)



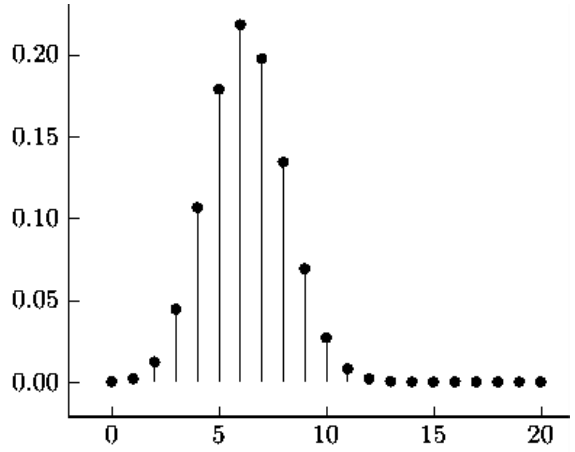
X ~ N(0, 1^2)



X ~ Binomial(n=20, p=0.6)



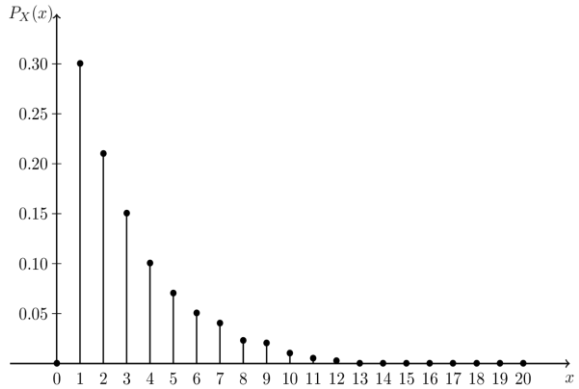
X ~ Hypergeometric (n=80, r=30, a=25)



Calculate the probability of one event.

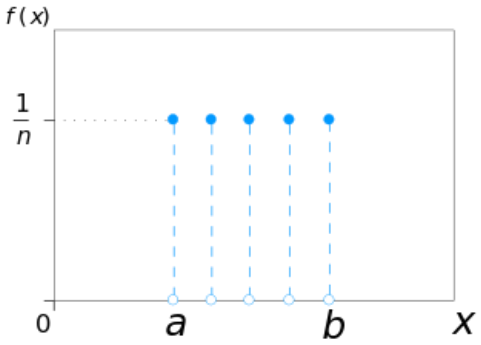
Geometric

$$P(x) = q^x\, p$$



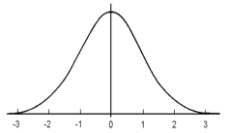
Uniform

$$P(x) = \frac{1}{n}$$



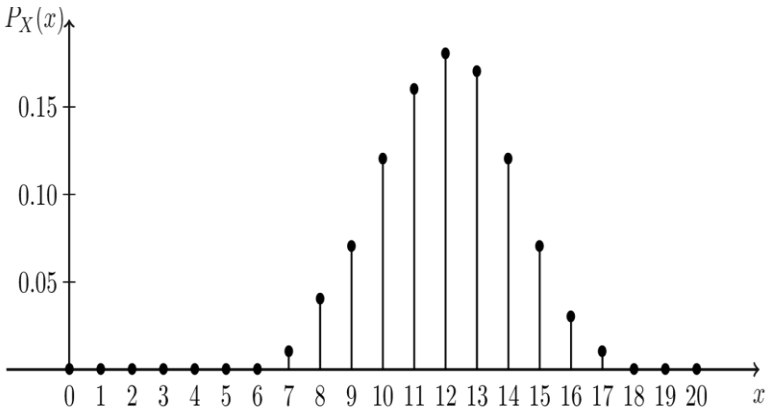
Normal

$$z = \frac{x - \bar{x}}{\sigma}$$



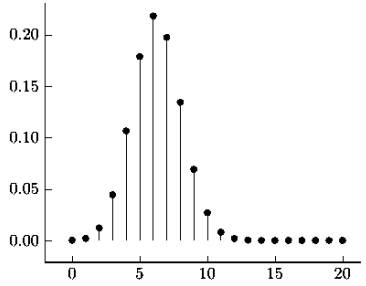
Binomial

$$P(x) = C(n,x) \times p^x \times q^{(n-x)}$$



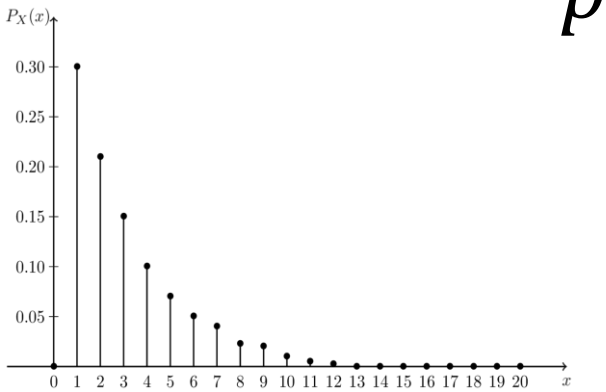
Hypergeometric

$$P(x) = \frac{C(a,x) \times C(n-a, r-x)}{C(n,r)}$$



Geometric

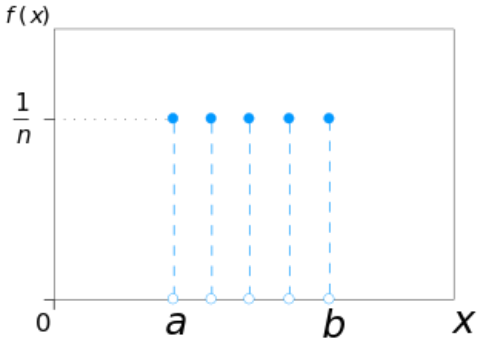
$$\mathrm{E}(x) = \frac{q}{p}$$



Calculate the expected value.

Uniform

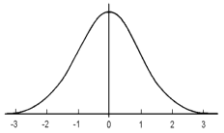
$$\mathrm{E}(x) = \frac{\min(x) + \max(x)}{2}$$



Normal

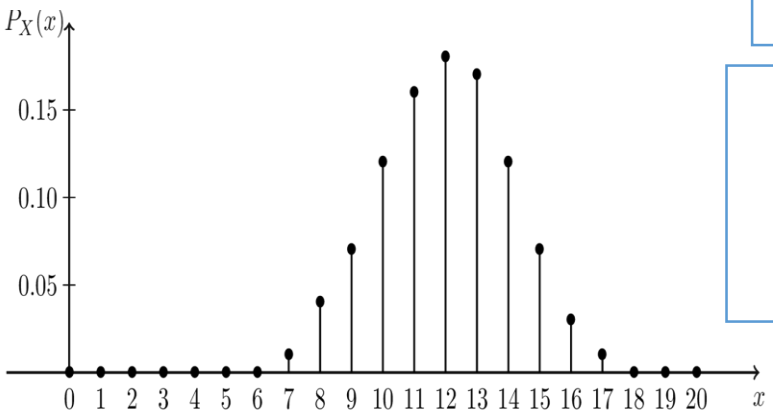
$$\bar{x} = \frac{\sum x}{n}$$

$$\bar{x} = \frac{\sum f \times x}{\sum f}$$



Binomial

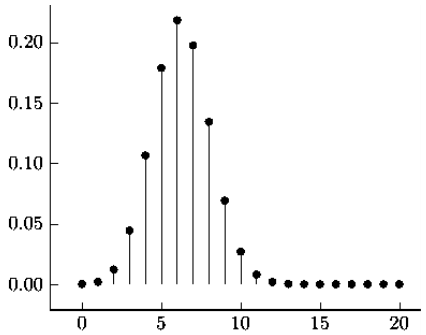
$$\mathrm{E}(x) = \bar{x} = n \times p$$



$$\mathrm{E}(x) = \sum P(x) \times x$$

Hypergeometric

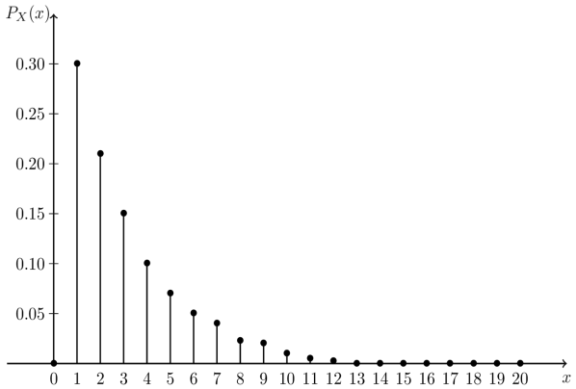
$$\mathrm{E}(x) = \frac{ra}{n}$$

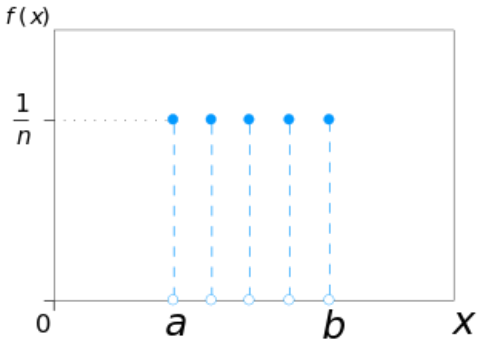


Geometric

Calculate the standard deviation.

Uniform

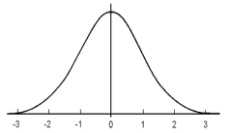




Normal

$$\sigma = \sqrt{\frac{\sum(x-\bar{x})^2}{n}}$$

$$\sigma = \sqrt{\frac{\sum f(x-\bar{x})^2}{\sum f}}$$



Binomial

$$\sigma = \sqrt{npq}$$

Hypergeometric