Example: Consider an infinite sequence of trials that are independent, a trial succeeds with probability p or fails with probability $1-p=q$. Let X be the # of trials until 1st success. So X is a positive, discrete random variable. In fact X is integer valued.

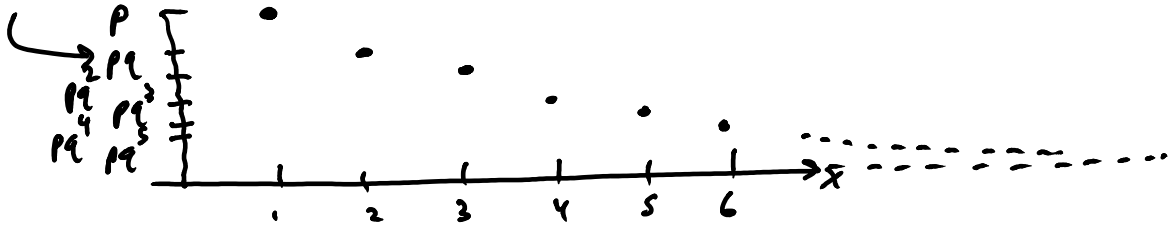
Mass of X: $p_X(x) = P(X=x) = q^{x-1}p$

CDF of X: $F_X(x) = P(X \le x) = P(X=1)+P(X=2)+P(X=3)+\cdots+P(X=x)$

for integers x.

$$= p + pq + pq^2 + \cdots + pq^{x-1}$$
$$= p(1+q+q^2+\cdots+q^{x-1})$$
$$= (1-q)(1+q+q^2+\cdots+q^{x-1})$$
$$= 1-q^x$$

plot the mass $p_X(x)$



plot the CDF $F_X(x)$