

CDF and pmf

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Satellite Example

Consider launching three satellites, each with a probability of 0.9 of reaching proper orbit. We can model the **pmf** of the random variable X , the number of successful orbits. This will also give us the **cdf** of X .

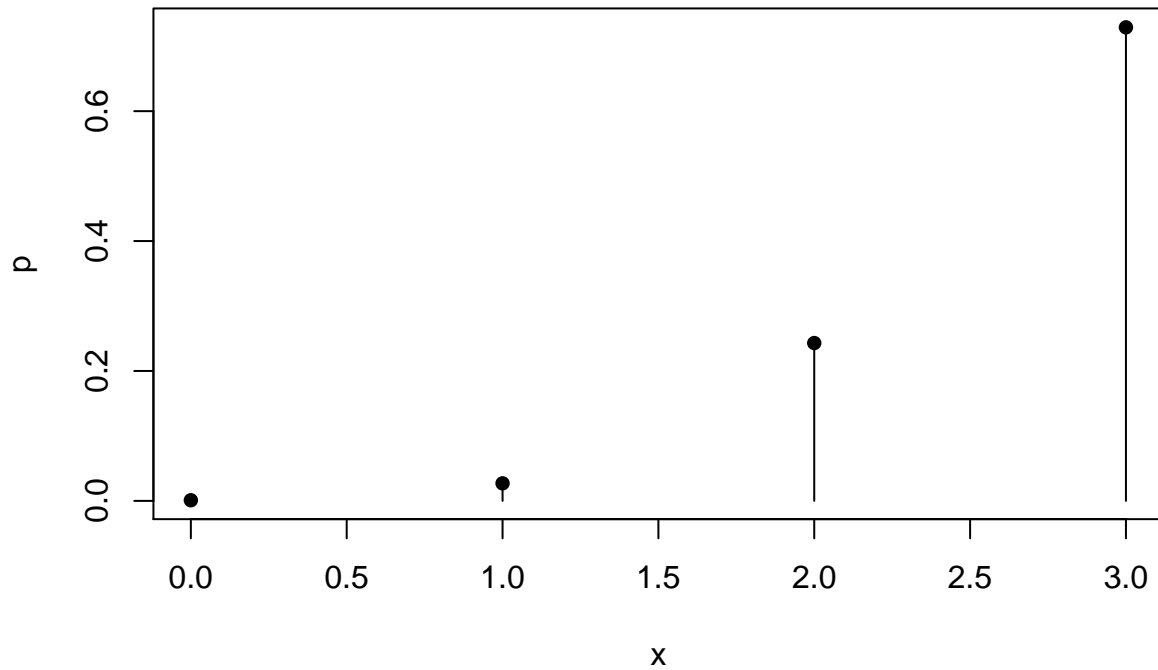
```
x = 0:3
p = c((1-0.9)^3, 3*0.9*0.1^2, 3*0.9^2*0.1, 0.9^3)

### It's easier to read if x and p are side-by-side.
cbind(x,p)

##      x      p
## [1,] 0 0.001
## [2,] 1 0.027
## [3,] 2 0.243
## [4,] 3 0.729

### We can also store the information in a data frame. Note the use of capital X.
X = data.frame(x,p)

### The relationship between x and p can be plotted. Graph the pmf.
plot(x, p, type="p", pch=16)
points(x, p, type="h")
```



The **cdf** can be obtained from the **pmf**.

```
X$F = cumsum(X$p)
X
```

```
##  x    p    F
## 1 0 0.001 0.001
## 2 1 0.027 0.028
## 3 2 0.243 0.271
## 4 3 0.729 1.000
```

```
plot(c(-1,X$x,4), c(0,X$F,1),type="s", ylab="F(x)", xlab="x")
points(X$x, X$p)
```

