NAME OF STUDENT: ASHUTOSH ARDU

REGISTRATION NO OF STUDENT: 20BRS1262

SLOT: L19+L20

DATE: 25-03-2021

LAB EXPERIMENT 4

1]

Probability of getting two 2's among ten dice

(Two ways of doing it, so that the answer can be verified)

```
~/
> #Find the Probability of getting two 2's among ten dice
> # n=10, x=2, p=1/6
> #dbinom(x,size=n,prob=p)
> dbinom(2,10,1/6)
[1] 0.29071
> #Q2 Find the P(2) by using binomial probability formula
> choose(10,2)*(1/6)^2*(5/6)^8
[1] 0.29071
>
```

2]

Probability of random variable from 0 to 10 where n=10 and p=1/6.

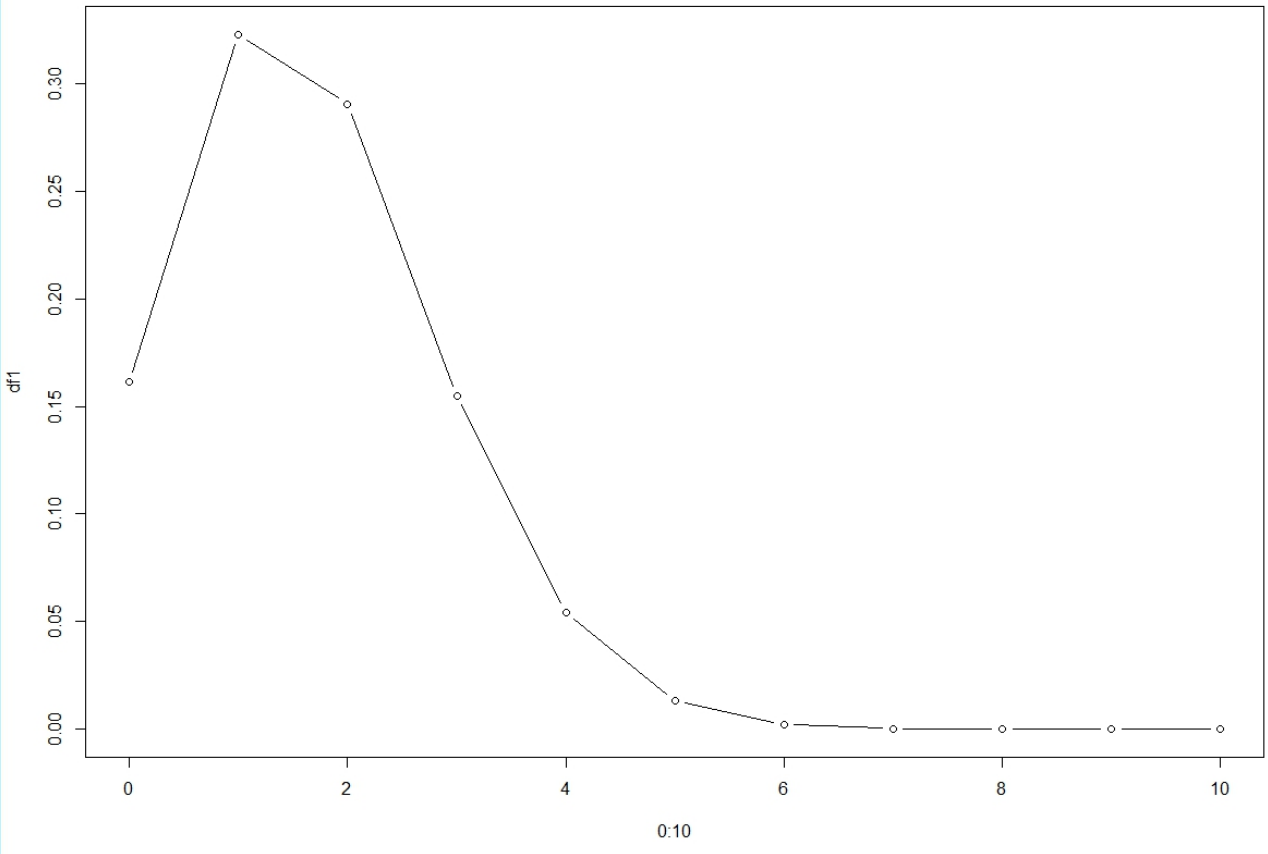
(Note that some of the values given below are zero because we are round them off till 7 decimal places and those quantities are lesser than 10^(-7) so they are round off as zero)

```
~/
> x=0:10
> df1=dbinom(x,10,1/6)
> df1=round(df1,7)
> df1
 [1] 0.1615056 0.3230112 0.2907100 0.1550454 0.0542659 0.0130238 0.0021706 0.0002481
 [9] 0.0000186 0.0000008 0.0000000
>
```

3]

Plotting a graph and make a data frame for the above/previously given data.

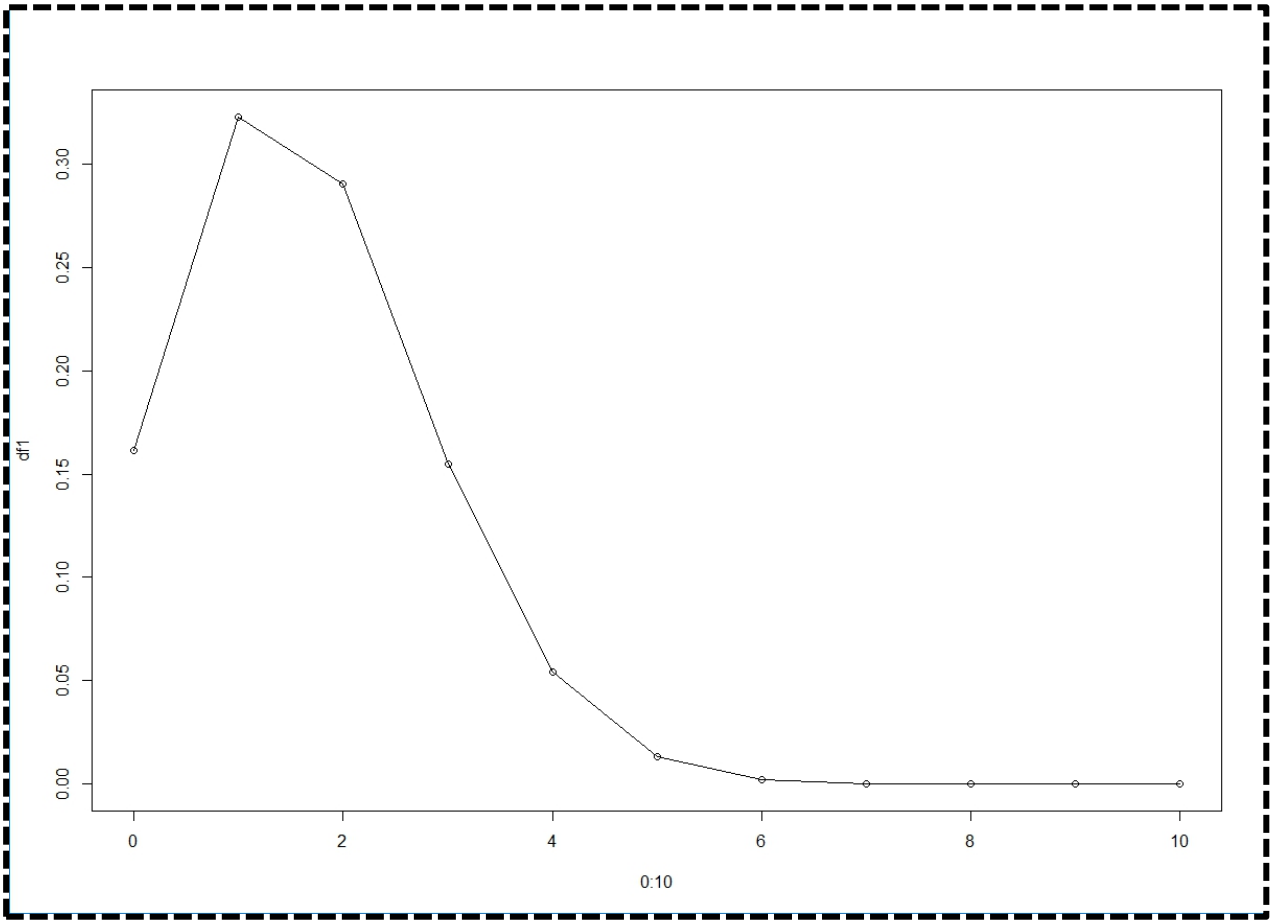
```
> x=c(0:10)
> df1=round(df1,10)
> data.frame(x,df1)
    x       df1
1   0 0.1615056
2   1 0.3230112
3   2 0.2907100
4   3 0.1550454
5   4 0.0542659
6   5 0.0130238
7   6 0.0021706
8   7 0.0002481
9   8 0.0000186
10  9 0.0000008
11 10 0.0000000
> plot(0:10,df1, type="b")
>
```



4]

Another form of the above graph

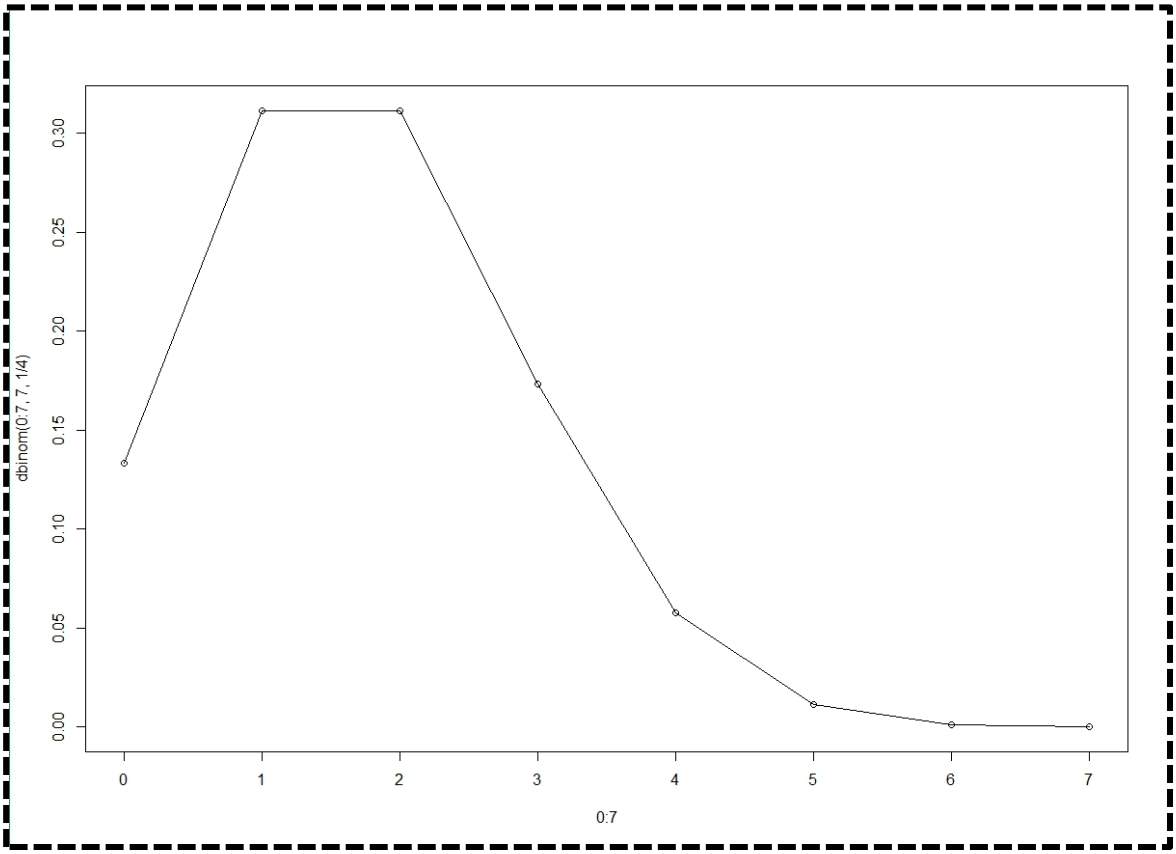
```
> x=c(0:10)
> df1=round(df1,10)
> data.frame(x,df1)
    x       df1
1   0 0.1615056
2   1 0.3230112
3   2 0.2907100
4   3 0.1550454
5   4 0.0542659
6   5 0.0130238
7   6 0.0021706
8   7 0.0002481
9   8 0.0000186
10  9 0.0000008
11 10 0.0000000
> plot(0:10,df1, type="o")
>
```



5]

In Binomial n=7, p=1/4 and the random variable x is from 0 to 100 and plotting its graph.

```
> y=dbinom(0:7,7,1/4)
> l=round(y,4)
> #iii. Display those probabilities in a table
> data.frame(x=c(0:7),l)
  x      l
1 0 0.1335
2 1 0.3115
3 2 0.3115
4 3 0.1730
5 4 0.0577
6 5 0.0115
7 6 0.0013
8 7 0.0001
> #iv. Show the shape of this binomial Distribution
> plot(0:7, dbinom(0:7,7,1/4), type="o")
>
```



6]

Sum of various probabilities of random variables.

```
> sum(dbinom(0:4,12,1/5))
[1] 0.9274445
> #or alternative
> pbinom(4,12,1/5)
[1] 0.9274445
>
```

7]

If 10% of the Screws produced by an automatic machine are defective, find the probability that out of 20 screws selected at random, there are

(i) Exactly 2 defectives

(ii) At least 2 defectives

(iii) Between 1 and 3 defectives (inclusive)

(i)

```
~/
> dbinom(2,20,1/10)
[1] 0.2851798
> choose(20,2)*(1/10)^2*(9/10)^18
[1] 0.2851798
>
```

ii)

```
~/
> pbinom(1,20,1/10,lower.tail =FALSE)
[1] 0.608253
> s=sum(dbinom(2:20,20,1/10))
> s
[1] 0.608253
>
```

iii)

```
~/
> sum(dbinom(1:3,20,1/10))
[1] 0.74547
> pbinom(3,20,1/10)-dbinom(0,20,1/10)
[1] 0.74547
>
```

8] Poison's Distribution **Date - 8 - 4 - 2021**

i] Producing set of values from 0 to 10.

```
Console  Terminal  Jobs
~/
> # 1
> 0:10
 [1]  0  1  2  3  4  5  6  7  8  9 10
>
```

ii] All the probabilities P(0),P(1),….,P(10)

```
Console  Terminal  Jobs
~/
> #2
> P=dpois(0:10,2)
> P=round(k,6)
> data.frame(P)
           P
1   0.135335
2   0.270671
3   0.270671
4   0.180447
5   0.090224
6   0.036089
7   0.012030
8   0.003437
9   0.000859
10  0.000191
11  0.000038
>
```

iii] P(X<=6)

Two ways to get it

```
Console  Terminal  Jobs
~/
> ppois(6,2,lower.tail=TRUE)
[1] 0.9954662
> sum(dpois(0:6,2))
[1] 0.9954662
>
```

iv] Sum of all probabilities

Two ways to get it

(its never one but it is close to the value one)

```
Console  Terminal  Jobs
~/
> sum(dpois(0:10,2))
[1] 0.9999917
> ppois(10,2)
[1] 0.9999917
>
```

v] P(X>6)

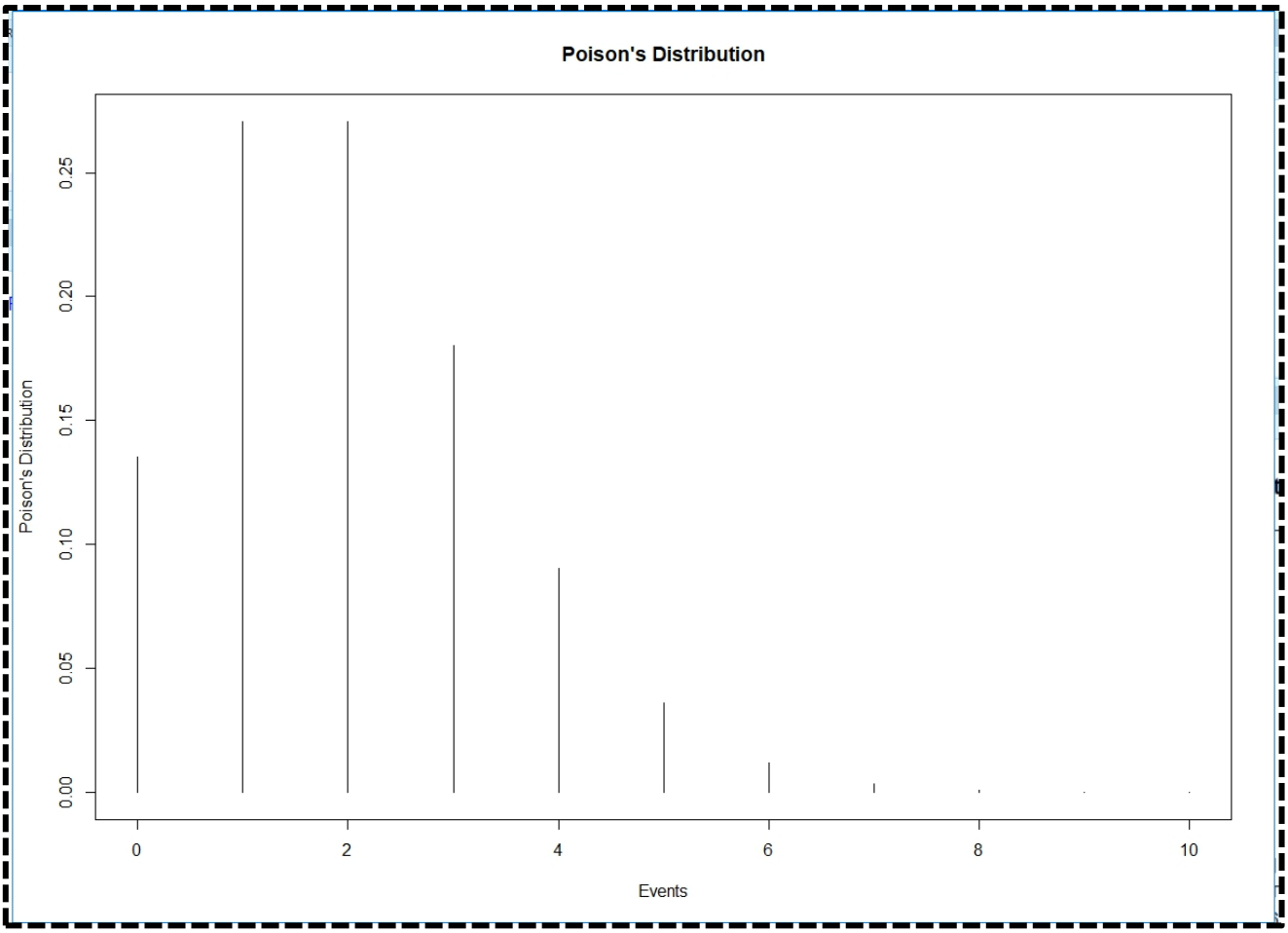
```
Console  Terminal  Jobs
~/
> #5
> ppois(6,2,lower.tail=FALSE)
[1] 0.004533806
> sum(dpois(7:10,2))
[1] 0.004525497
>
```

vi] All the Poison's Probabilities from 0 to 11 and their respective Cumulative Probabilities

```
Console  Terminal  Jobs
~/
> #6
> P=dpois(0:11,2)
> P=round(P,5)
> cumulative=cumsum(dpois(0:11,2))
> cumulative=round(cumulative,5)
> table=data.frame(P,cumulative)
> table
         P cumulative
1  0.13534    0.13534
2  0.27067    0.40601
3  0.27067    0.67668
4  0.18045    0.85712
5  0.09022    0.94735
6  0.03609    0.98344
7  0.01203    0.99547
8  0.00344    0.99890
9  0.00086    0.99976
10 0.00019    0.99995
11 0.00004    0.99999
12 0.00001    1.00000
>
```

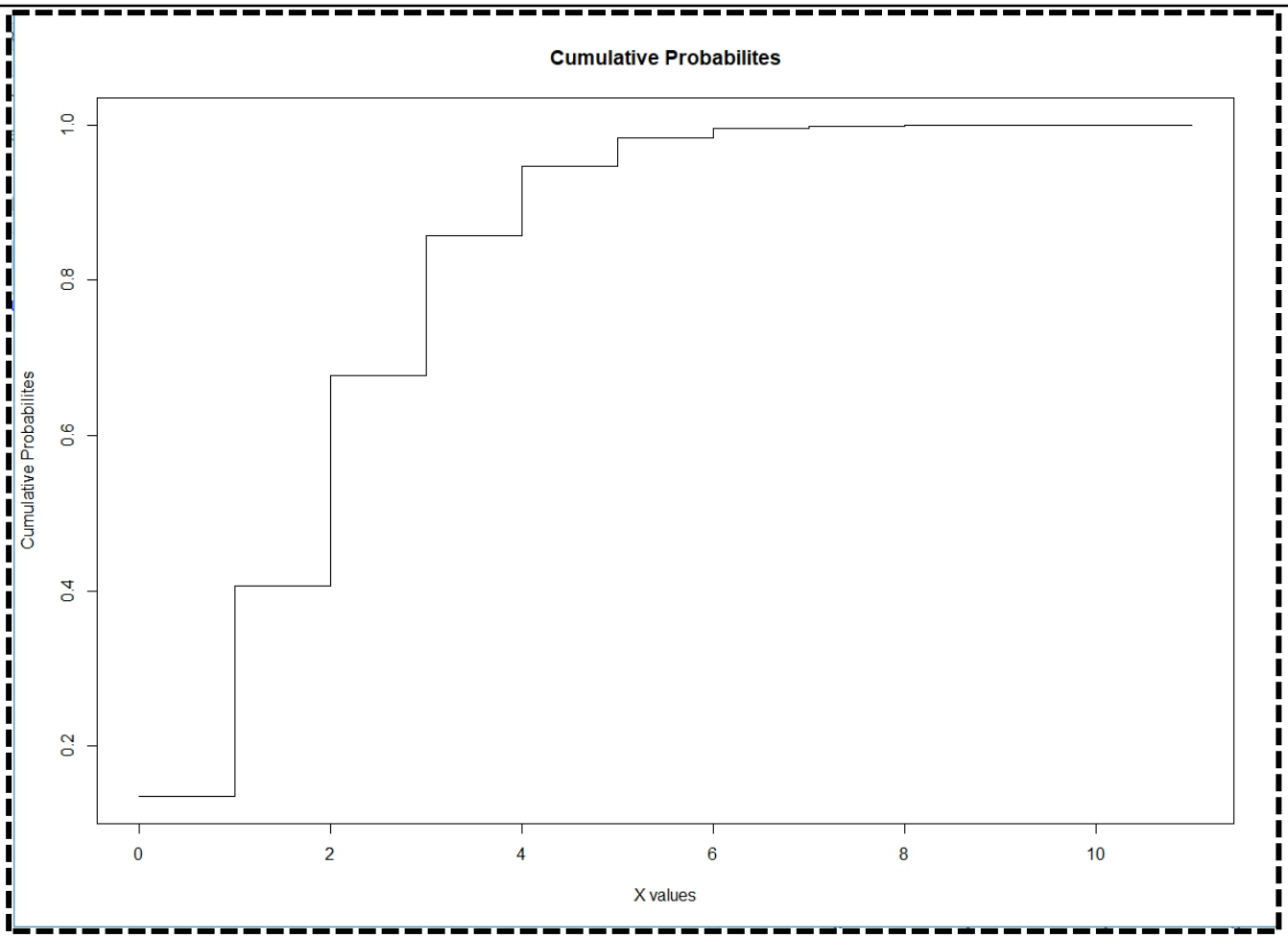
vii] Plot for Poison's Probabilities from P(0) till P(10)

```
Console  Terminal  Jobs
~/
> #7
> plot(0:10,dpois(0:10,2),main="Poison's Distribution",type='h',xlab='Events',ylab="Poison's D
istribution")
>
```



Also plot Cumulative Probabilities from P(0) till P(11)

```
Console  Terminal  Jobs
~/
> plot(0:11,cumulative,main="Cumulative Probabilites",type='s',xlab='X values',ylab="Cumulativ
e Probabilites")
>
```


Cumulative Probabilites
Cumulative Probabilites
0.2
0.4
0.6
0.8
1.0
0
2
4
6
8
10
X values