

Discrete Probability Distribution

```
#Install package
```

```
install.packages("stats")
```

```
#To remove package after use
```

```
detach("stats", unload = TRUE)
```

```
#Load library to load and use package
```

```
library(e1071)
```

```
library(distr)
```

```
#Prefix used
```

- p for "probability", the cumulative distribution function (c. d. f.)
- q for "quantile", the inverse c. d. f.
- d for "density", the density function (p. f. or p. d. f.)
- r for "random", a random variable having the specified distribution

```
#Frequency table
```

```
random=sample(1:10, size=1000, replace = TRUE)
```

```
t=table(random)
```

```
barplot(t)
```

```
#How to enter data
```

```
rdiscrete( 30, c('0.2','0.5','0.3') )
```

```
rdiscrete( 100, c('0.2','0.5','0.3'), c("A","B","C"))
```

```
#Example
```

```
y= rdiscrete( 100, c(1/4,2/4,1/4), c(0,1,2))
```

```
factor(y)
```

```
levels(factor(y))
```

```
table((factor(y)))
```

```
#To find probability associated to any random variable for example  
x=1
```

```
ddiscrete(1, c(1/4,2/4,1/4), c(0,1,2))
```

```
#Example of rolling of die
```

```
# generate the vector of probabilities
```

```
probability <- rep(1/6, 6)
```

```

# plot the probabilities
barplot(probability, xlab = "outcomes", main = "Probability
Distribution")

# generate the vector of cumulative probabilities
cum_probability <- cumsum(probability)

# plot the probabilities
barplot(cum_probability, xlab = "outcomes", main = "Cumulative
Probability Distribution")

Note: Plots must be customized by using the knowledge of Practical
2.

#Mean and variance
X=c(0,1,2,3,4)
P=c(0.1,0.15,0.2,0.55)
XP=X*P
data.frame(X,P,XP)
mean=sum(XP)

#Find unknown for 0.6+6x=1
f <- function(x) (0.6+6*x-1)
uniroot(f, lower=0, upper=1)$root

```

EXERCISE (Programing and problem solving)

1. PDF of random variable X is:

X	1	2	3	4	5	6	7
P(X)	k	2 k	3 k	k ²	k ² + k	2k ²	4k ²

Find $k, P(X < 5), P(1 \leq X \leq 5)$

Write a R program for the above problem. Also write a R program to plot probability distribution.

2. A random variable X has the following pdf

X	-2	-1	0	1	2	3
P(X)	0.1	k	0.2	2k	0.3	3k

Find k, $p(X < 2)$, c.d.f.

Write a R program for the above problem. Also write a R program to plot cumulative distribution function.

3. A RV X has the following probability distribution:

X	-2	-1	0	1	2
P(X=x)	1/5	1/5	2/5	2/15	1/15

Find the probability distribution of $V = X^2 + 1$.

Write a R program for the above problem and also draw the plot.

4. Given the following distribution:

x	-3	-2	-1	0	1	2
P(X=x)	0.05	0.1	0.2	0.3	0.2	0.15

Find Mean and Variance.

Write a R program for the above problem.

5. An urn contains 7 white and 3 red balls. Two balls are drawn together, at random from this urn. Compute the expected number of white balls drawn
Write a R program for above problem. Also write a program for to plot probability distribution and cumulative probability distribution.