NAME: Heli Vijay Naliapara
ROLL NO.: K068

PNS – LAB 3

```r
#1

#Defining function
f=function(k)(8*k-1)
uniroot(f,lower=0,upper=1)$root
a=function(k3)

f=function(k)(8*k-1)
uniroot(f,lower=0,upper=1)$root
a=function(k)(8*k^2+7*k-1)
uniroot(a,lower=0,upper=1)$root
x = c(1:7)
p = c(1/8,1/4,3/8,1/64,9/64,1/32,1/16)

#1] finding P[x<5]
i = sum(p[1:4])
print(i)

#1] finding P[1<=x<=5]
j = sum(p[1:5])
print(j)
```

OUTPUT:

```
Console  Background Jobs
R 4.2.2 · ~/
> #1
>
> #Defining function
> f=function(k)(8*k-1)
> uniroot(f,lower=0,upper=1)$root
[1] 0.125
> a=function(k3)
+
+   f=function(k)(8*k-1)
> uniroot(f,lower=0,upper=1)$root
[1] 0.125
> a=function(k)(8*k^2+7*k-1)
> uniroot(a,lower=0,upper=1)$root
[1] 0.1249938
> x = c(1:7)
> p = c(1/8,1/4,3/8,1/64,9/64,1/32,1/16)
>
> #1] finding P[x<5]
> i = sum(p[1:4])
> print(i)
[1] 0.765625
>
> #1] finding P[1<=x<=5]
> j = sum(p[1:5])
> print(j)
[1] 0.90625
>
```

NAME: Heli Vijay Naliapara
ROLL NO.: K068

PNS – LAB 3

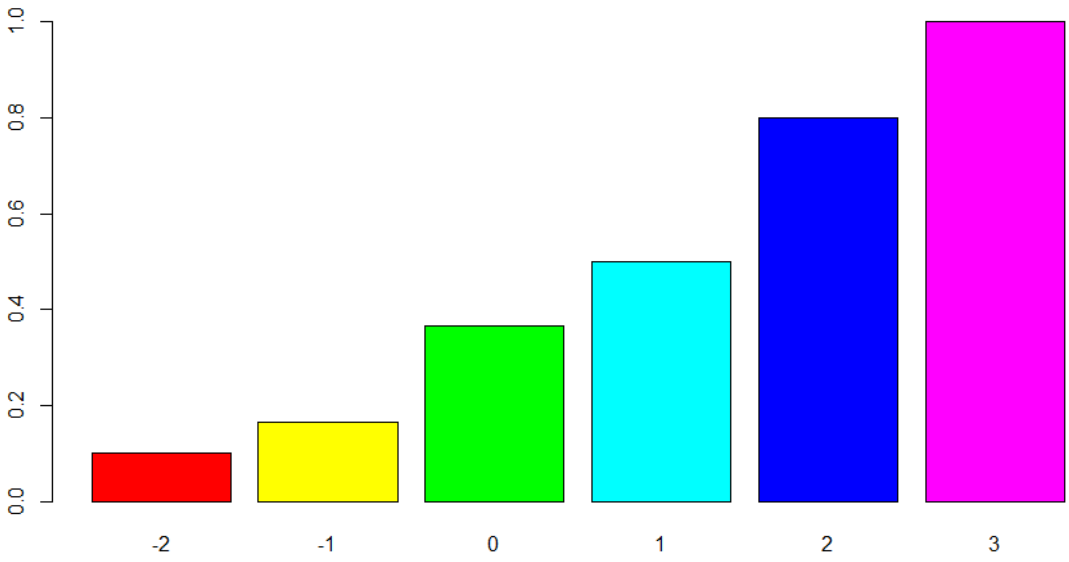
```r
#2

a=function(k)(6*k-0.4)
uniroot(a,lower=0,upper=1)$root
x = c(-2,-1,0,1,2,3)
p = c(1/10,1/15,2/10,2/15,3/10,1/5)

#1] finding P[x<2]
i = sum(p[1:4])
print(i)
q=cumsum(p)
barplot(q,names.arg=x,col=rainbow(6))
```

OUTPUT:

```
> #2
>
> a=function(k)(6*k-0.4)
> uniroot(a,lower=0,upper=1)$root
[1] 0.06666667
> x = c(-2,-1,0,1,2,3)
> p = c(1/10,1/15,2/10,2/15,3/10,1/5)
>
> #1] finding P[x<2]
> i = sum(p[1:4])
> print(i)
[1] 0.5
> q=cumsum(p)
> barplot(q,names.arg=x,col=rainbow(6))
>
```



NAME: Heli Vijay Naliapara
ROLL NO.: K068

PNS – LAB 3

```r
#3

x=c(-2,1,0,1,2)
p=c(1/5,1/5,2/5,2/15,1/15)
v=x*x+1
print(v)
a=p[1]+p[5]
print(a)
b=p[2]+p[4]
print(b)
c=p[3]
print(c)
```

OUTPUT:

```
R 4.2.2 · ~/
> #3
>
> x=c(-2,1,0,1,2)
> p=c(1/5,1/5,2/5,2/15,1/15)
> v=x*x+1
> print(v)
[1] 5 2 1 2 5
> a=p[1]+p[5]
> print(a)
[1] 0.2666667
> b=p[2]+p[4]
> print(b)
[1] 0.3333333
> c=p[3]
> print(c)
[1] 0.4
>
```

```r
#4

x=c(-3,-2,1,0,1,2)
p=c(0.05, 0.1, 0.2, 0.3, 0.2, 0.15)

a_mean=sum(x*p)
print(a_mean)
a_sq_mean=sum(x*x+p)
variance = a_sq_mean-{(a_mean)* (a_mean) }
print(variance)
```

OUTPUT:

NAME: Heli Vijay Naliapara
ROLL NO.: K068

PNS – LAB 3

```
> #4
>
> x=c(-3,-2,1,0,1,2)
> p=c(0.05, 0.1, 0.2, 0.3, 0.2, 0.15)
>
> a_mean=sum(x*p)
> print(a_mean)
[1] 0.35
> a_sq_mean=sum(x*x+p)
> variance = a_sq_mean-{(a_mean)* (a_mean) }
> print(variance)
[1] 19.8775
```

```
#5

x=c(0, 1, 2)
p=c(1/9,2/9,2/3)

#1] finding P[x<1]
i = sum(p[1])
print(i)

#2] finding P[1<x<=2]
j = sum(p[3])
print(j)

#3] finding P[0<x<=2]
k = sum(p[2:3])
print(k)
```

OUTPUT:

NAME: Heli Vijay Naliapara
ROLL NO.: K068

PNS – LAB 3

```
> #5
>
> x=c(0, 1, 2)
> p=c(1/9,2/9,2/3)
>
> #1] finding P[x<1]
> i = sum(p[1])
> print(i)
[1] 0.1111111
>
> #2] finding P[1<x<=2]
> j = sum(p[3])
> print(j)
[1] 0.6666667
>
> #3] finding P[0<x<=2]
> k = sum(p[2:3])
> print(k)
[1] 0.8888889
>
```

```
#6

f=function(x)(1+x)
integrate(f, lower=2, upper=5)

x=c (2,3,4,5)

k = 2/27
print(k)

f1=function(x)(0.074+0.074*x)
integrate (f1, lower=2, upper=4)
```

OUTPUT:

```
> #6
>
> f=function(x)(1+x)
> integrate(f, lower=2, upper=5)
13.5 with absolute error < 1.5e-13
>
> x=c (2,3,4,5)
>
> k = 2/27
> print(k)
[1] 0.07407407
>
> f1=function(x)(0.074+0.074*x)
> integrate (f1, lower=2, upper=4)
0.592 with absolute error < 6.6e-15
>
```

NAME: Heli Vijay Naliapara
ROLL NO.: K068

PNS – LAB 3

PAGE No.
DATE / /

PNS Lab 3

1) PDF of random variables x is :-

x	1	2	3	4	5	6	7
P(x)	k	2k	3k	k^2	k^2+k	$2k^2$	$4k^2$

Find k, $P(x<5)$, $P(1 \le x \le 5)$

⇒ $P(x=x)$ $Pi = 1$

$\sum Pi = k + 2k + 3k + k^2 + k^2 + k + 2k^2 + k^2$

$1 = 7k + 8k^2$

$7k + 8k^2 - 1 = 0$

$k = 1/8, -1$

$\therefore k = 1/8$

$P(x<5) = k + 2k + 3k + k^2$

$= 6k + k^2$

$= 6 \times \frac{1}{8} + \left(\frac{1}{8}\right)^2$

$= \frac{3}{4} + \frac{1}{64}$

$= \frac{49}{64} = 0.77$

$P(1 \le x \le 5) = 7k + 2k^2$

$= 7 \times \frac{1}{8} + 2 \times \frac{1}{8} \times \frac{1}{8}$

$= \frac{7}{8} + \frac{1}{32}$

$= \frac{29}{32} = 0.91$

NAME: Heli Vijay Naliapara
ROLL NO.: K068

PNS – LAB 3

2]

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

Find k, $P(X<2)$

$$0.1 + k + 0.2 + 2k + 0.3 + 3k = 1$$
$$0.6 + 6k = 1$$
$$6k = 0.4$$
$$k = 0.06$$

$x < 2$

$$= 0.1 + k + 0.2 + 2k$$
$$= 0.3 + 3k$$
$$= 0.3 + 3(0.06)$$
$$= 0.48$$

cdf

$0 \quad x < -2$

$0.1 \quad -2 \le x \le -1$

$k + 0.1 \quad -1 \le x < 0$

$k + 0.1 + 0.2 \quad 0 \le x < 1$

$k + 0.1 + 0.2 + 2k \quad 1 \le x < 2$

$k + 0.1 + 0.2 + 2k + 0.3 \quad 2 \le x < 3$

$k + 0.1 + 0.2 + 2k + 0.3 + 3k \quad 3 \le x < 4$

$1 \quad x \ge 3$

NAME: Heli Vijay Naliapara
ROLL NO.: K068

PNS – LAB 3

3]

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

$V = x^2 + 1$

V	5	2	1
$P(V=v)$	$1/5 + 1/15$	$1/5 + 2/15$	$2/5$

$P(V=5) = P[1] + P[5]$
$P(V=2) = P[2] + P[4]$
$P(V=1) = P[3]$

4]

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

$\sum x P_x$
$= (-3)(0.05) + \ldots$
$= 0.15 - 0.2 - 0.2 + 0 + 0.2 + 0.3$
$= -0.05$

$Var(x) = E(x^2) + (E(x))^2$
$= 9 \times 0.05 + 4(0.1) + 1(0.2) + 0.3 + 1 \times 0.2 \times 4 \times 0.15$
$= 1.35 + 0.4 + 0.2 + 0.2 + 0.60$
$= 2.75$

$Var(x) = 2.7304$

NAME: Heli Vijay Naliapara
ROLL NO.: K068

PNS – LAB 3

Q.5] (i) $\sum P(X=x) = (3c^3 + 4c - 10c^2 + 5c - 1) = 1$

$= 3c^3 + 9c - 10c^2 = 2$

$c = 2, 1, 1/3$

(ii)

X	0	1	2
$P(X=x)$	$\frac{1}{9}$	$\frac{4}{3} - \frac{10}{9}$	$\frac{5}{3} - 1$

$P(X < 1) = P(0) = \frac{1}{9}$

$P(X \leq 2) = P(2) = \frac{5}{3} - 1 = \frac{2}{3}$

$P(0 < X \leq 2) = 1 - \frac{1}{9} = \frac{8}{9}$

$K\left[\left(\frac{10+25}{2}\right) - 4\right] = 1$

$K\left[5 + \frac{25}{2} - 4\right] = 1$

$K\left[\frac{2+25}{2}\right] = 1$

$K\left[\frac{27}{2}\right] = 1$

$\boxed{K = \frac{2}{27}}$

NAME: Heli Vijay Naliapara
ROLL NO.: K068

PNS – LAB 3

$$P(x<4) = \int_2^3 f(x)\,dx$$

$$= \frac{2}{27}\left[\left(3+\frac{9}{2}\right) - (2+2)\right]$$

$$= \frac{2}{27}\left[3+\frac{9}{2}-4\right] = \frac{6+9-8}{2} * \frac{2}{27} = \frac{7}{27}$$

Q.6] $$f(x) = \int_a^b f(x)\,dx = 1$$

$$= \int_2^5 k(1+x) = 1$$

$$= k\int_2^5 (1+x) = 1$$

$$= k\int_2^5 \left(x + \frac{x^2}{2}\right) = 1$$

$$= k\,[30-6] = 1$$

$$= 24k = 1$$

$$= k = \frac{1}{24}$$