Probability and Statistics

Lab-3 Part-B

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```
#q7
f=function(x)(6*x*x-6*x*x*x)
m=integrate(f,lower=0,upper=1)$value
print(m)

f=function(x)(6*x*x*x-6*x*x*x*x)
sm=integrate(f,lower=0,upper=1)$value
print(sm)

v=sm-(m*m)
print(v)
```

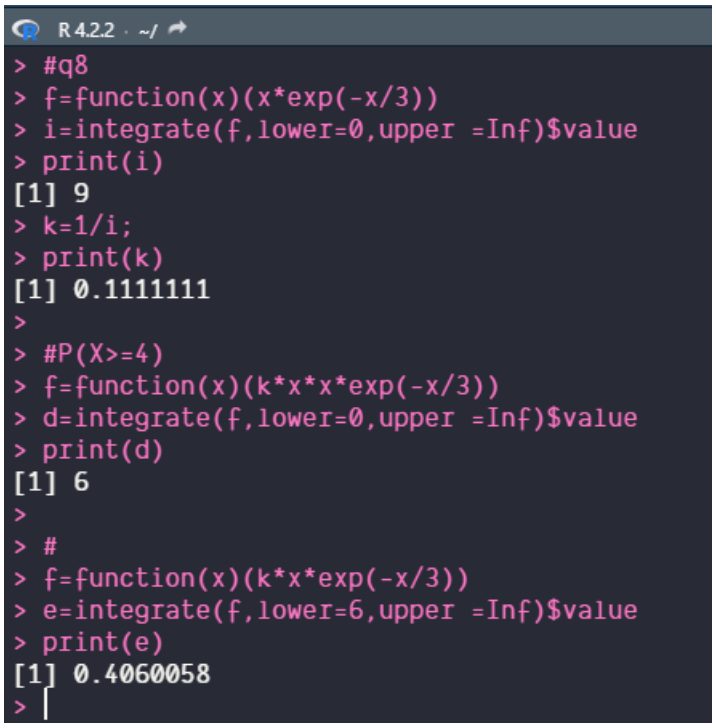
OUTPUT:

```
> #q7
> f=function(x)(6*x*x-6*x*x*x)
> m=integrate(f,lower=0,upper=1)$value
> print(m)
[1] 0.5
>
> f=function(x)(6*x*x*x-6*x*x*x*x)
> sm=integrate(f,lower=0,upper=1)$value
> print(sm)
[1] 0.3
>
> v=sm-(m*m)
> print(v)
[1] 0.05
```

```
#q8
f=function(x)(x*exp(-x/3))
i=integrate(f,lower=0,upper =Inf)$value
print(i)
k=1/i;
```

```
print(k)


#P(X>=4)
f=function(x)(k*x*x*exp(-x/3))
d=integrate(f,lower=0,upper =Inf)$value
print(d)


#
f=function(x)(k*x*exp(-x/3))
e=integrate(f,lower=6,upper =Inf)$value
print(e)
```

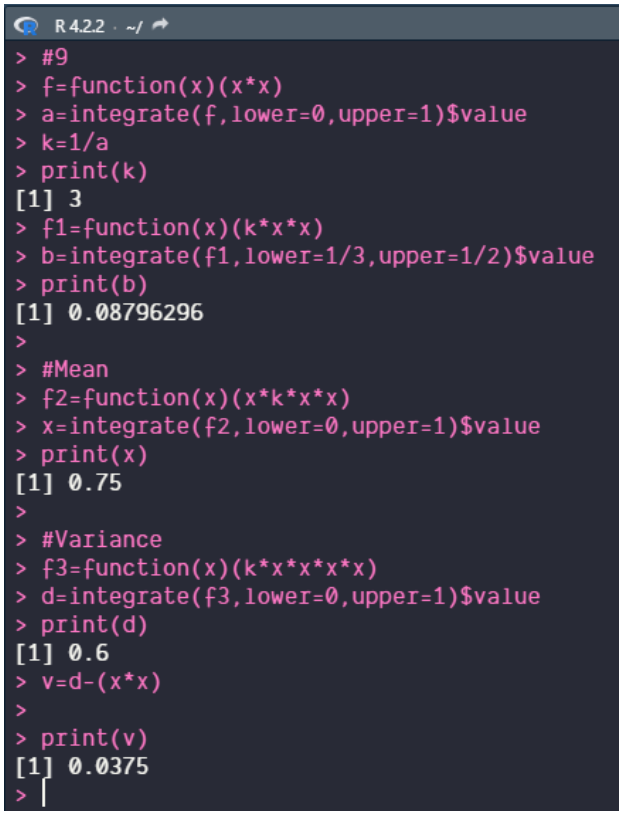
OUTPUT:



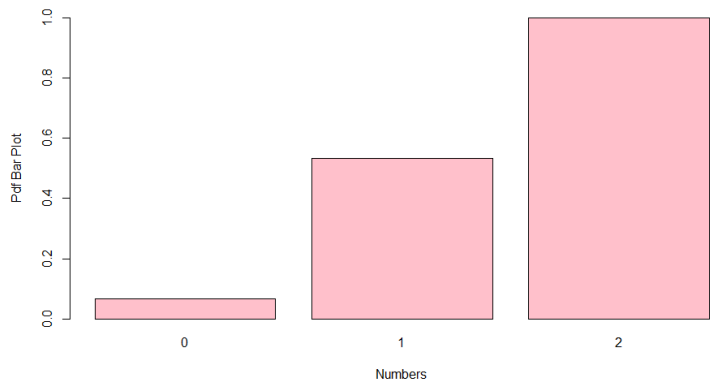

```
#q9
f=function(x)(x*x)
a=integrate(f,lower=0,upper=1)$value
k=1/a
print(k)
```

```
f1=function(x)(k*x*x)
b=integrate(f1,lower=1/3,upper=1/2)$value
print(b)

#Mean
f2=function(x)(x*k*x*x)
x=integrate(f2,lower=0,upper=1)$value
print(x)

#Variance
f3=function(x)(k*x*x*x*x)
d=integrate(f3,lower=0,upper=1)$value
print(d)
v=d-(x*x)

print(v)
```

OUTPUT:



```
#q10
s=choose(10,2)
#condition when white balls are 0 and therefore 2 balls are red
n1=choose(3,2)/s  #n(r)
print(n1)
#Condition when 1 white ball and 1 red ball
n2=(choose(7,1)*choose(3,1))/s
print(n2)
#Condition when white ball is 3
n3=choose(7,2)/s
print(n3)
#values of x , number of white balls in all 3 cases
x=c(0,1,2)
p=c(n1,n2,n3)
#expected value or mean value
m=sum(x*p)
print(m)
#cdf
c=cumsum(p)
print(c)
#barplot
barplot(p,names.arg=x,xlab="Numbers",ylab="Pdf Bar
Plot",col="pink",border="black",ylim=c(0:1))
barplot(c,names.arg=x,xlab="Numbers",ylab="Pdf Bar
Plot",col="pink",border="black",ylim=c(0:1))
```



OUTPUT :

```
R 4.2.2 · ~/
> #q10
>
> s=choose(10,2)
> #condition when white balls are 0 and therefore 2 balls are red
> n1=choose(3,2)/s  #n(r)
> print(n1)
[1] 0.06666667
> #Condition when 1 white ball and 1 red ball
> n2=(choose(7,1)*choose(3,1))/s
> print(n2)
[1] 0.4666667
> #Condition when white ball is 3
> n3=choose(7,2)/s
> print(n3)
[1] 0.4666667
> #values of x , number of white balls in all 3 cases
> x=c(0,1,2)
> p=c(n1,n2,n3)
> #expected value or mean value
> m=sum(x*p)
> print(m)
[1] 1.4
> #cdf
> c=cumsum(p)
> print(c)
[1] 0.06666667 0.53333333 1.00000000
> #barplot
> barplot(p,names.arg=x,xlab="Numbers",ylab="Pdf Bar Plot",col="pink",border="black",ylim=c(0:1))
> barplot(c,names.arg=x,xlab="Numbers",ylab="Pdf Bar Plot",col="pink",border="black",ylim=c(0:1))
> #ylim gives y axis
>
```