[HW1 - MATH 331 - Due Feb 25]

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[2/24/2021]

Exercise 1:

```
n=20 # number of trial
p=.45 # probability of one success
#A
#P(Y=4)
dbinom(4,n,p)
```

```
## [1] 0.01392986
```

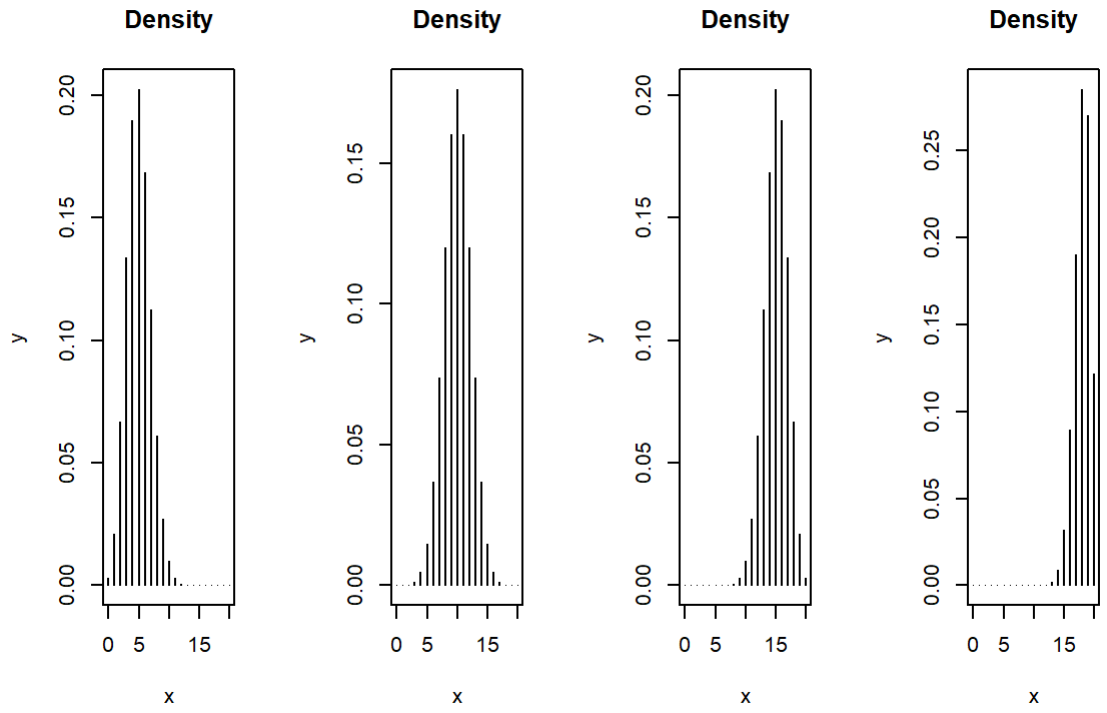
```
#B
pbinom(16,n,p)
```

```
## [1] 0.9997228
```

```
#C
qbinom(0.90,n,p)
```

```
## [1] 12
```

```
#D
par(mfrow=c(1,4))
x=0:20
plot(x,dbinom(x,20,1/4),type="h",xlab ="x",ylab="y",main="Density")
plot(x,dbinom(x,20,1/2),type="h",xlab ="x",ylab="y",main="Density")
plot(x,dbinom(x,20,3/4),type="h",xlab ="x",ylab="y",main="Density")
plot(x,dbinom(x,20,.9),type="h",xlab ="x",ylab="y",main="Density")
```



Exercise 2:

```
#a
dpois(x=20, lambda=100)
```

```
## [1] 1.529069e-22
```

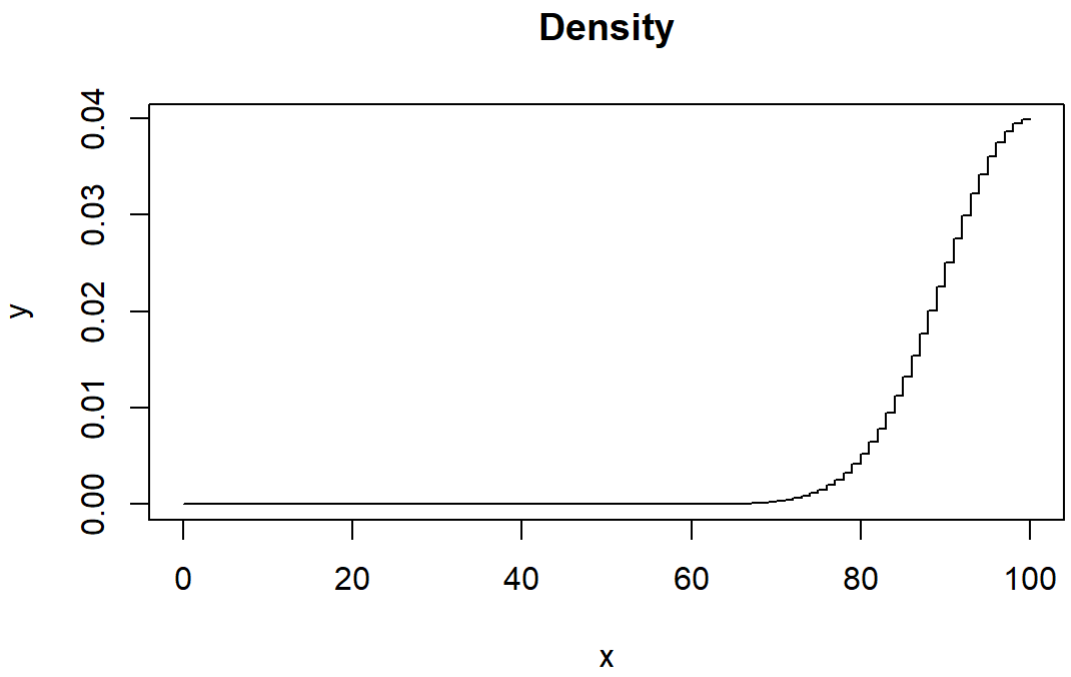
```
#b
ppois(q=15,lambda=100, lower.tail = TRUE, log.p = FALSE)
```

```
## [1] 3.340076e-26
```

```
#c
qpois(p=.95,lambda=100, lower.tail = TRUE, log.p = FALSE)
```

```
## [1] 117
```

```
#D
x=0:100
plot(x,dpois(x,100),type="s",xlab ="x",ylab="y",main="Density")
```



Exercise 3:

```
#a
mu=2
sigma=3
pnorm(8,mean=mu,sd=sigma)
```

```
## [1] 0.9772499
```

```
#b
mu=2
sigma=3
pnorm(8,mean=mu,sd=sigma) -pnorm(4,mean=mu,sd=sigma)
```

```
## [1] 0.2297424
```

```
#c
1-pnorm(10,mean=mu,sd=sigma)
```

```
## [1] 0.003830381
```

```
#d
qnorm(0.95,mean=mu,sd=sigma)
```

```
## [1] 6.934561
```

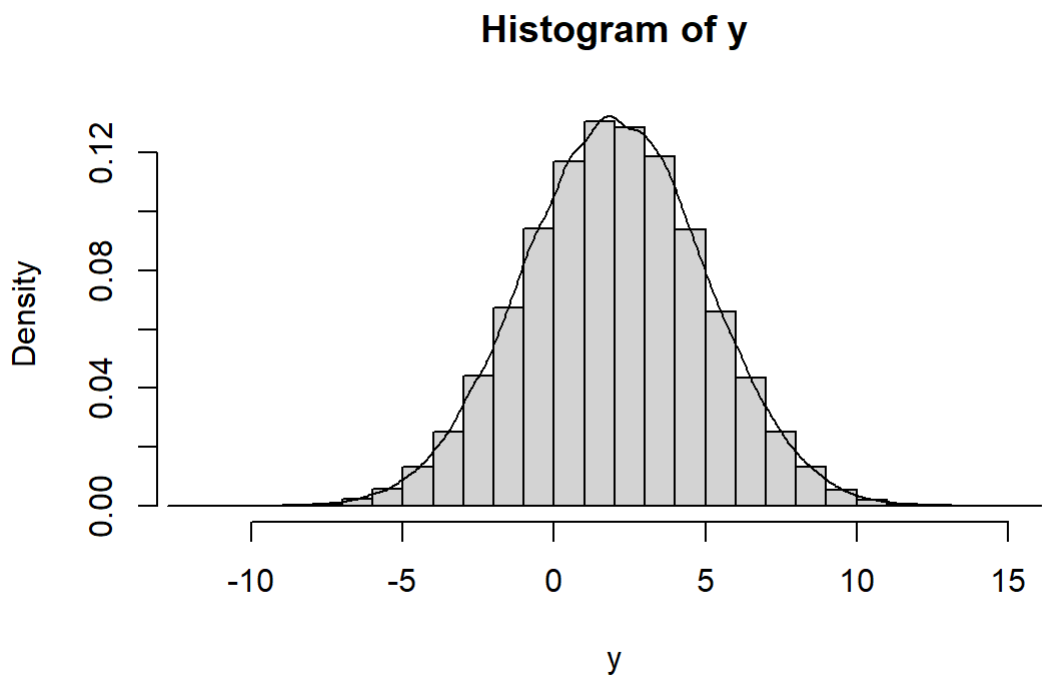
```
#a=6.934561
#e
qnorm(0.05,mean=mu,sd=sigma)
```

```
## [1] -2.934561
```

```
qnorm(0.95,mean=mu,sd=sigma)
```

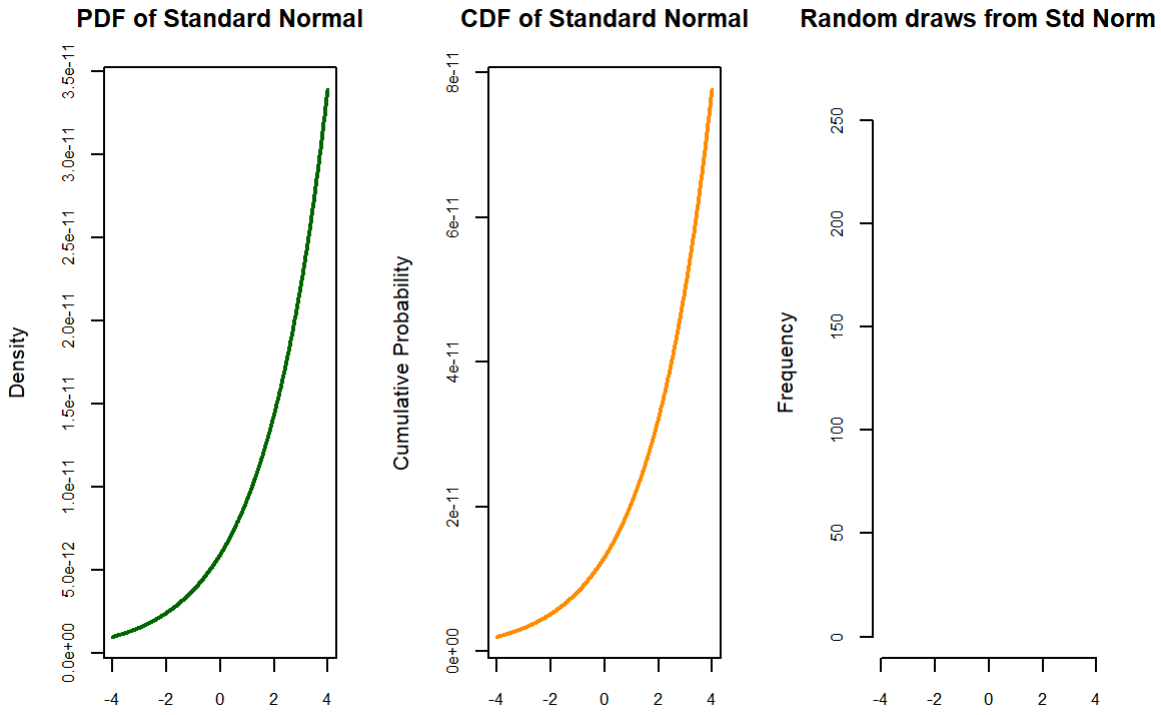
```
## [1] 6.934561
```

```
#a=-2.934561
#b=6.934561

#f
y=rnorm(100000,mean=mu,sd=sigma)
hist(y,breaks=30,prob=T) #gives the histogram
lines(density(y))             # overlay the density function on the histogram
```



Exercise 4:

```
set.seed(3000)
mu=100
sigma=15
x<-seq(-4,4,.01)
densities<-dnorm(x, mu,sigma)
cumulative<-pnorm(x, mu,sigma)
randomdeviates<-rnorm(1000,mu,sigma)

par(mfrow=c(1,3), mar=c(3,4,4,2))

plot(x, densities, col="darkgreen",xlab="", ylab="Density", type="l",lwd=2, cex=2, main="PDF of
 Standard Normal", cex.axis=.8)

plot(x, cumulative, col="darkorange", xlab="", ylab="Cumulative Probability",type="l",lwd=2, cex
=2, main="CDF of Standard Normal", cex.axis=.8)

hist(randomdeviates, main="Random draws from Std Normal", cex.axis=.8, xlim=c(-4,4))
```




```
#<-------
```

Exercise 5:

```
nu=15
#a
pt(2,df=nu)
```

```
## [1] 0.9680275
```

```
#b
pt(1.5,df=nu)-pt(-1,df=nu)
```

```
## [1] 0.7562316
```

```
#c
pt(2.85,df=nu)
```

```
## [1] 0.9939168
```

```
#d
qt(0.95,df=nu)
```

```
## [1] 1.75305
```

```
#1.75305=a
#e
pt(0.95,df=nu)
```

```
## [1] 0.8214155
```

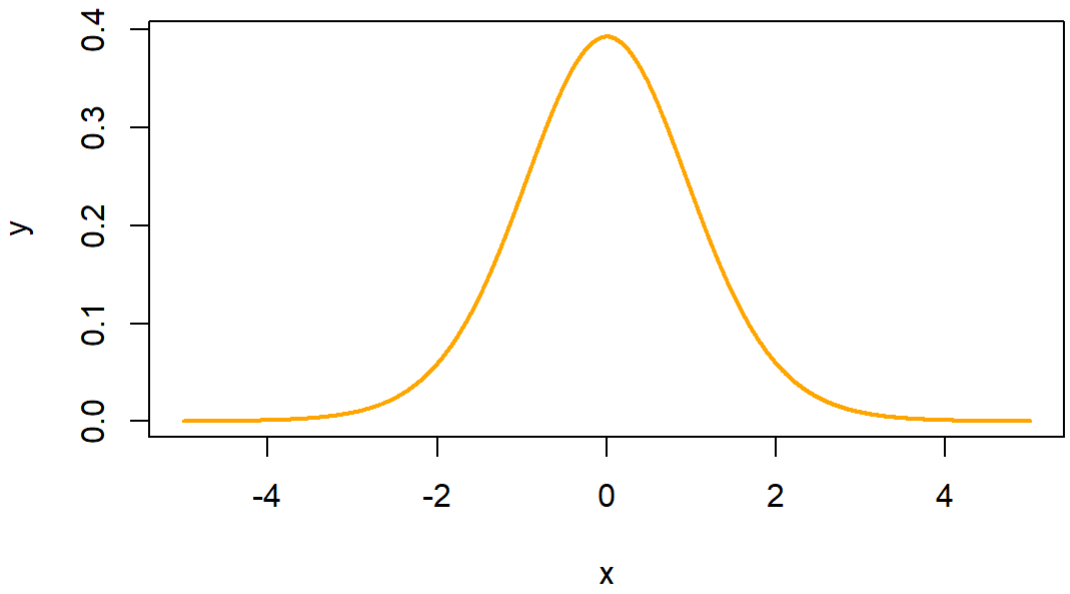
```
pt(0.05,df=nu)
```

```
## [1] 0.5196089
```

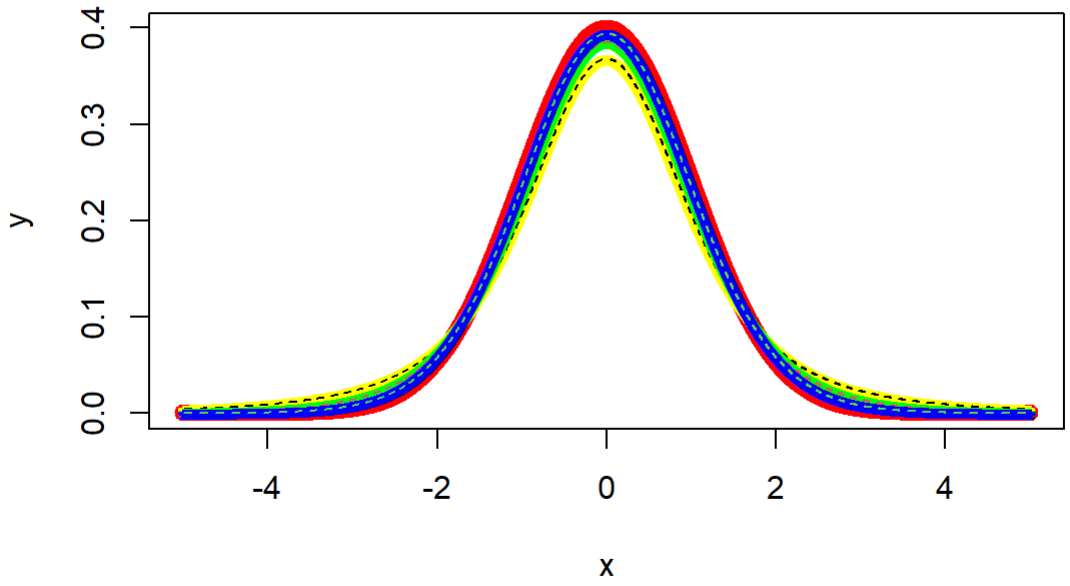
```
#b=1.75305
#a=0.5196089
tail(rt(100000,df=nu))
```

```
## [1]  1.5825230 -2.0322784  0.1881610  1.2764606  3.7928187 -0.8558286
```

```
x=seq(-5,5,by=0.001)
y=dt(x,df=nu)
plot(x,y,type="l",lwd=2,col="orange")
```



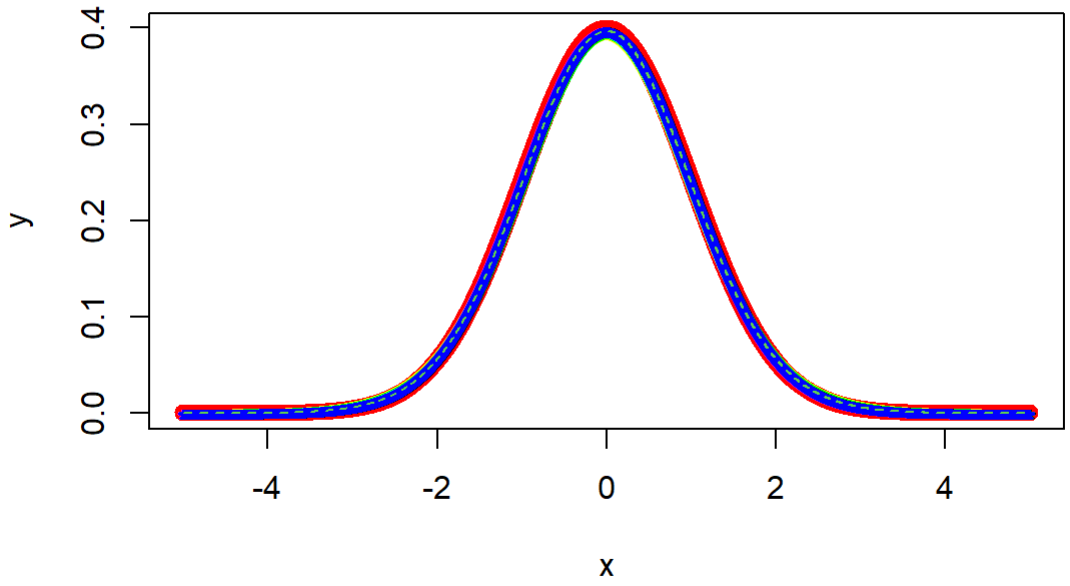

```
plot(x,dnorm(x,0,1),lwd=2,col="red", ylab="y")
y1=dt(x,df=3)
y2=dt(x,df=7)
y3=dt(x,df=20)


points(x, y1, col="yellow", pch="*")
lines(x, y1, col=1,lty=2)

points(x, y2, col="green", pch="*")
lines(x, y2, col=2,lty=2)

points(x, y3, col="blue", pch="*")
lines(x, y3, col=3,lty=2)
```




```
#<-------
```

Exercise 6:

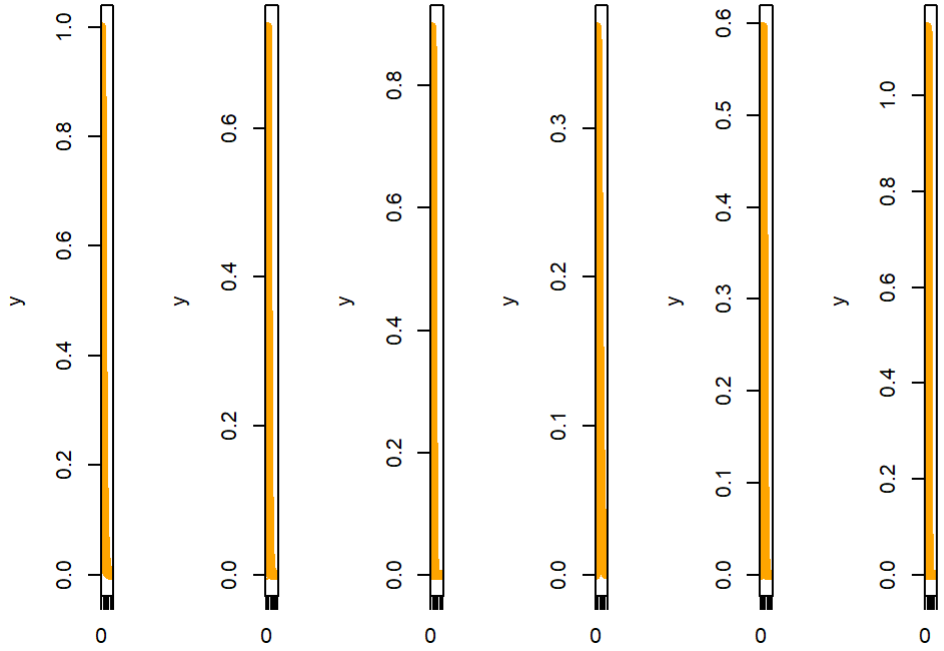
```
plot(x,dnorm(x,0,1),lwd=2,col="red", ylab="y") #the standard normal curve
y1=dt(x,df=20) #t-distribution with 20 df
y2=dt(x,df=25) #t-distribution with 25 df
y3=dt(x,df=40) #t-distribution with 40 df
y4=dt(x,df=60) #t-distribution with 60 df
y5=dt(x,df=80) #t-distribution with 80 df
y6=dt(x,df=100) #t-distribution with 100 df


points(x, y1, col="yellow", pch="*")
lines(x, y1, col=1,lty=2)

points(x, y2, col="green", pch="*")
lines(x, y2, col=2,lty=2)

points(x, y3, col="blue", pch="*")
lines(x, y3, col=3,lty=2)
```




```
#Is see that with more sample sizes the graphs become closer together
```

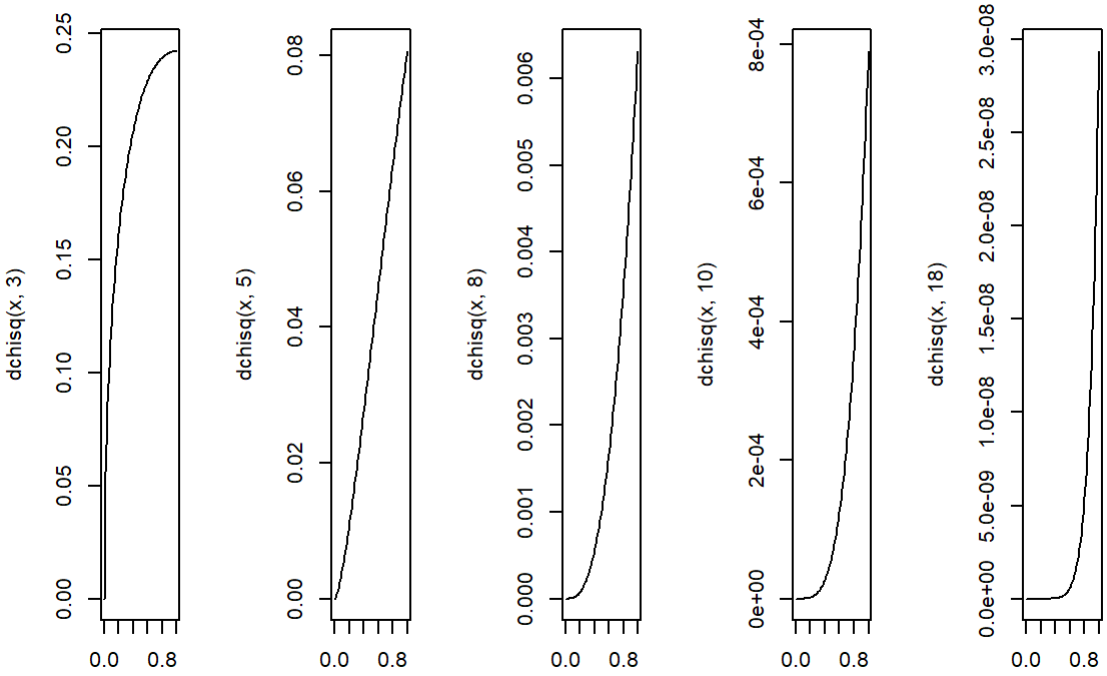
Exercise 7:

```
par(mfrow=c(1,7), mar=c(3,4,4,2))
x=seq(0,10,by=0.001)
y=dgamma(x,1,1)
plot(x,y,lty=2,col="orange")

x=seq(0,10,by=0.001)
y=dgamma(x,2,2)
plot(x,y,lty=2,col="orange")


x=seq(0,10,by=0.001)
y=dgamma(x,4,4)
plot(x,y,lty=2,col="orange")

x=seq(0,10,by=0.001)
y=dgamma(x,2,1)
plot(x,y,lty=2,col="orange")

x=seq(0,10,by=0.001)
y=dgamma(x,8,4)
plot(x,y,lty=2,col="orange")

x=seq(0,10,by=0.001)
y=dgamma(x,32,16)
plot(x,y,lty=2,col="orange")
# I see that the graph all skew towards the right.
```



Exercise 8:

```
#A
par(mfrow=c(1,5), mar=c(3,4,4,2))
curve(dchisq(x,3))
curve(dchisq(x,5))
curve(dchisq(x,8))
curve(dchisq(x,10))
curve(dchisq(x,18))
```



```
#b)
pchisq(2.34,18)
```

```
## [1] 3.973399e-06
```

```
pchisq(4,18)-pchisq(0,18)
```

```
## [1] 0.0002374473
```

```
qchisq(.05,18)
```

```
## [1] 9.390455
```

```
qchisq(.95,18)
```

```
## [1] 28.8693
```

Exercise 9:

```
# Work listed in a separate word document in the folder submitted.
```

Exercise 10:

```
# Work listed in a separate word document in the folder submitted.
```