596 HW7
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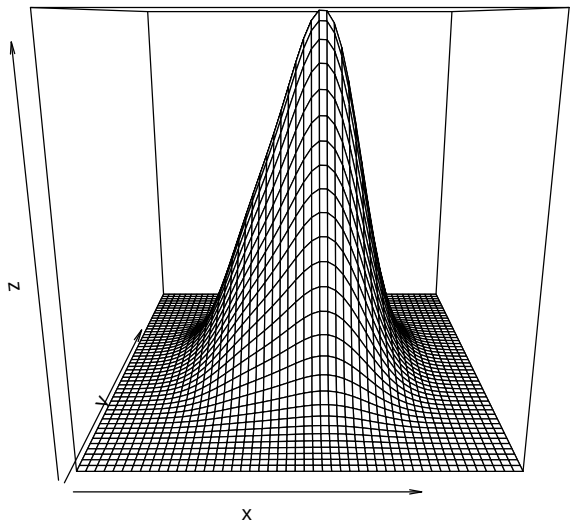
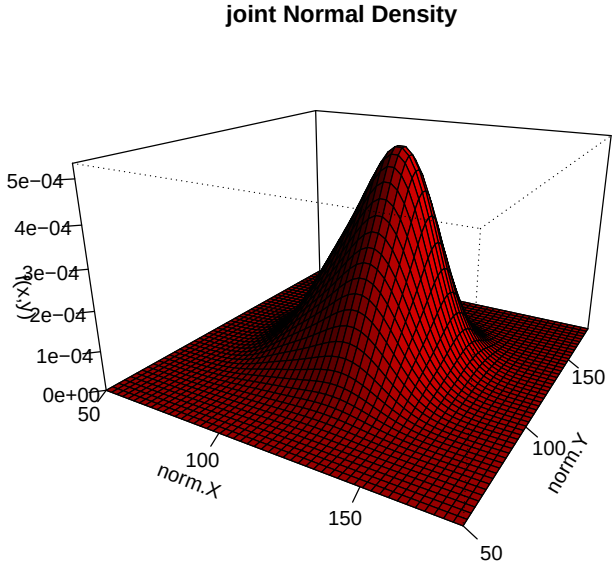
A.

```
> set.seed(596)
> p<-0.3
> f.mix <- function(x, y){
+  return((p*dnorm(x,100,13) +(1-p)* dnorm(x,125,13))*(p*dnorm(y,100,13)
+           +(1-p)* dnorm(y,125,13)))
+ }
> y <- x <- seq(from=50, to=180, length=50)
> z <- outer(x, y, f.mix)
> persp(x,y,z)
```

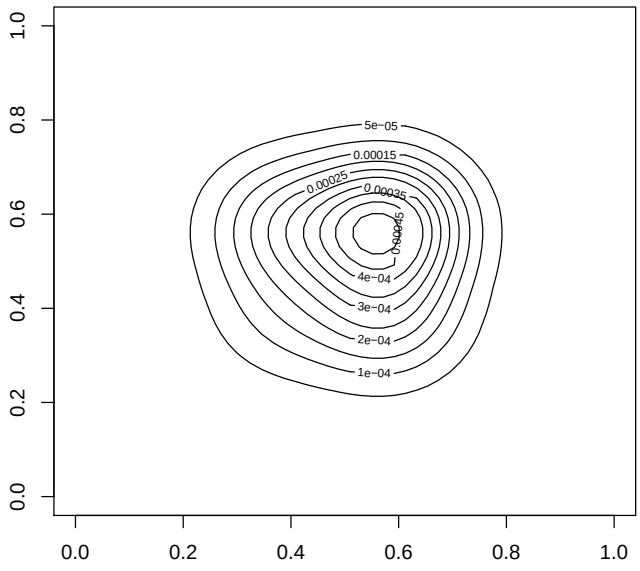



```
> M <- persp(x, y, z, theta = 30, phi=20, expand=0.6, ltheta=120, shade=0.75,
+            ticktype="detailed", xlab="norm.X", ylab="norm.Y", zlab="f(x,y)",
+            col="red", main="joint Normal Density")
```


joint Normal Density
5e−04
4e−04
3e−04
2e−04
1e−04
0e+00
f(x,y)
50
100
150
norm.X
50
100
150
norm.Y

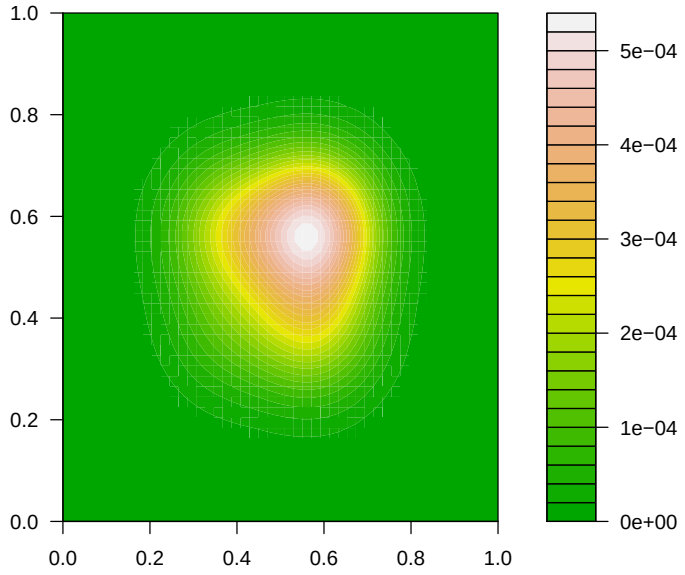
B.

```
> contour(z)
```



C.

```
> filled.contour(z, color.palette = terrain.colors)
```



D.

```
> pp<-rbinom(20000,1,0.3)
> x<-rep(NA,10000)
> y<-rep(NA,10000)
> for(i in 1:20000)
+ {
+   if(i<10001){
+     if(pp[i]==1){x[i]<-rnorm(1,100,13)}
+     if(pp[i]==0){x[i]<-rnorm(1,125,13)}
+   }
+   if(i>10000){
+     if(pp[i]==1){y[i-10000]<-rnorm(1,100,13)}
+     if(pp[i]==0){y[i-10000]<-rnorm(1,125,13)}
+   }
+ }
> pair<-matrix(NA,nrow=10000,ncol=2)
> for(i in 1:10000)
+ {pair[i,1]<-x[i]
+  pair[i,2]<-y[i]
+ }
> head(pair)
         [,1]       [,2]
```

```
[1,] 132.7579 111.01445
[2,] 114.5900  93.44042
[3,] 110.1523 121.76724
[4,] 127.7052  87.23884
[5,] 134.8035 127.56791
[6,] 129.1576 129.34023
```

E

```
> install.packages("gplots",repos="http://cran.us.r-project.org")

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        C:\Users\CYM\AppData\Local\Temp\RtmpCs4qlV\downloaded_packagesÀï

> library(gplots)
> hist2d(pair, nbins=100, col=c("blue", rev(terrain.colors(100))))

----------------------------
2-D Histogram Object
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Call: hist2d(x = pair, nbins = 100, col = c("blue", rev(terrain.colors(100))))

Number of data points:  10000
Number of grid bins:  100 x 100
X range: ( 54.20348 , 174.2554 )
Y range: ( 49.99025 , 172.816 )
```

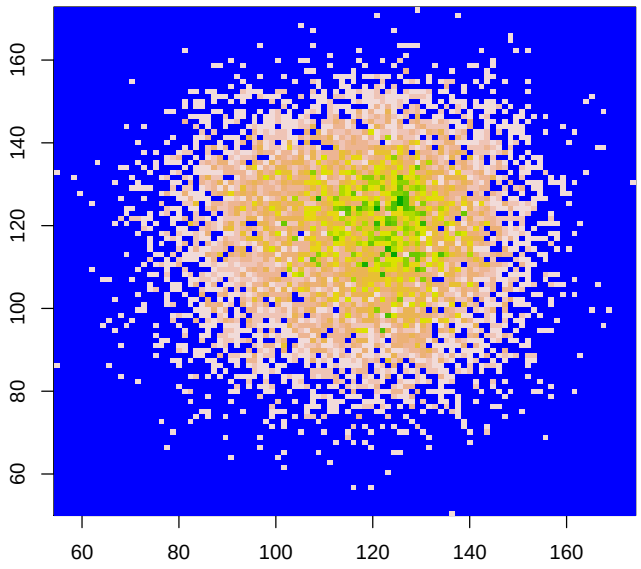
60
80
100
120
140
160
60
80
100
120
140
160