Lab04

Question 1a

```
#returns bin height
counts = function(x, n) {
  binEdge = seq(min(x), max(x), by = (max(x)-min(x))/n)
  v <- vector(mode="numeric", length = n)
  for ( i in 1:n) {
    v[i] = sum(x >= binEdge[i] & x < binEdge[i+1] )
  }
  #for the last interval, upper limit is closed
  v[n] = sum(x == max(x))
  return (v)
}
```

Question 1b

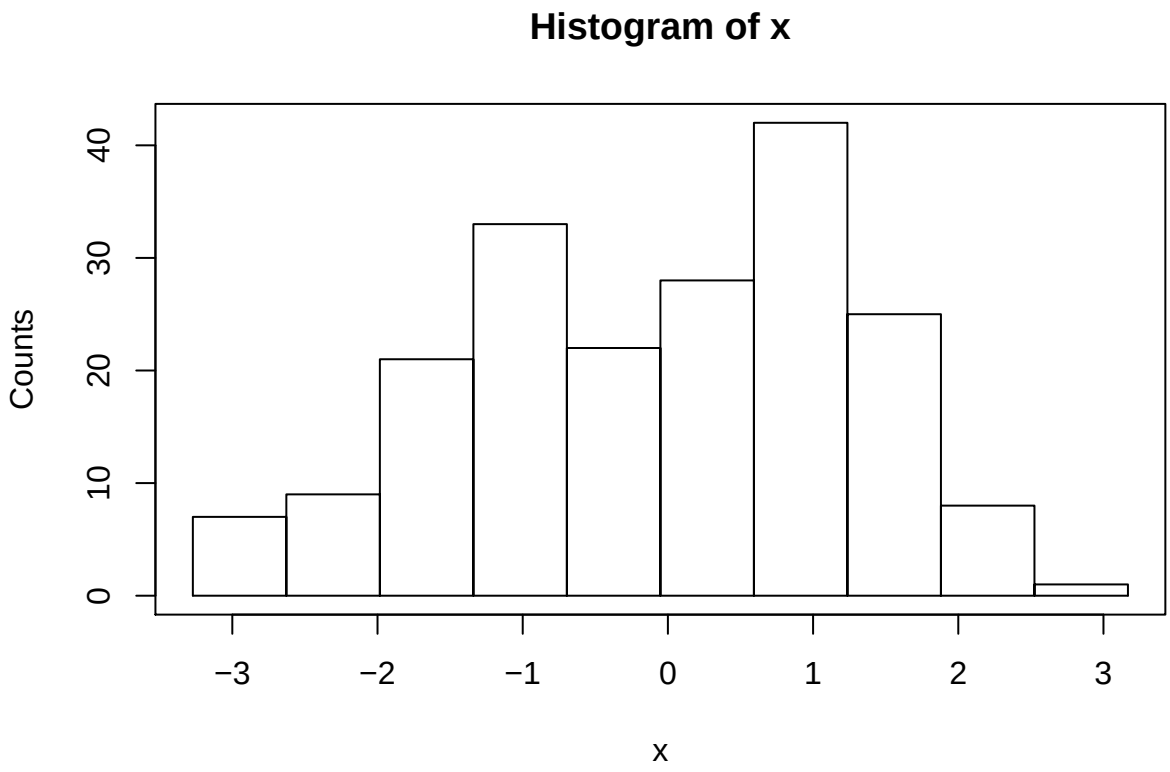
```
histo = function (x, n) {
  count = counts(x, n)
  binEdge = seq(min(x), max(x), by = (max(x)-min(x))/n)
  #X, Y are the paired coordinates for lines function to traverse
  #each bin needs 3 points for lines function to traverse, plus the initial point
  X = vector(mode = "numeric", length = 3*n + 1 )
  Y = vector(mode = "numeric", length = 3*n + 1 )
  plot (1, type="n", xlab="x", ylab="Counts",
        xlim=c(min(binEdge),max(binEdge)),ylim=c(0, max(count)),
        main = "Histogram of x"
  )
  #initial points
  X[1] = (binEdge[1]); Y[1]=0
  # set up the coordinates for lines function to connect
  for (i in 1: n) {
    X[3*i-1] = binEdge[i]
    Y[3*i-1] = count[i]

    X[3*i]   = binEdge[i+1]
    Y[3*i]   = count[i]

    X[3*i+1] = binEdge[i+1]
    Y[3*i+1] = 0
  }
  # connects the coordinates
  lines(X,Y)
  # line y = 0
  lines(c(min(x),max(x)) , c(0,0))
}
```

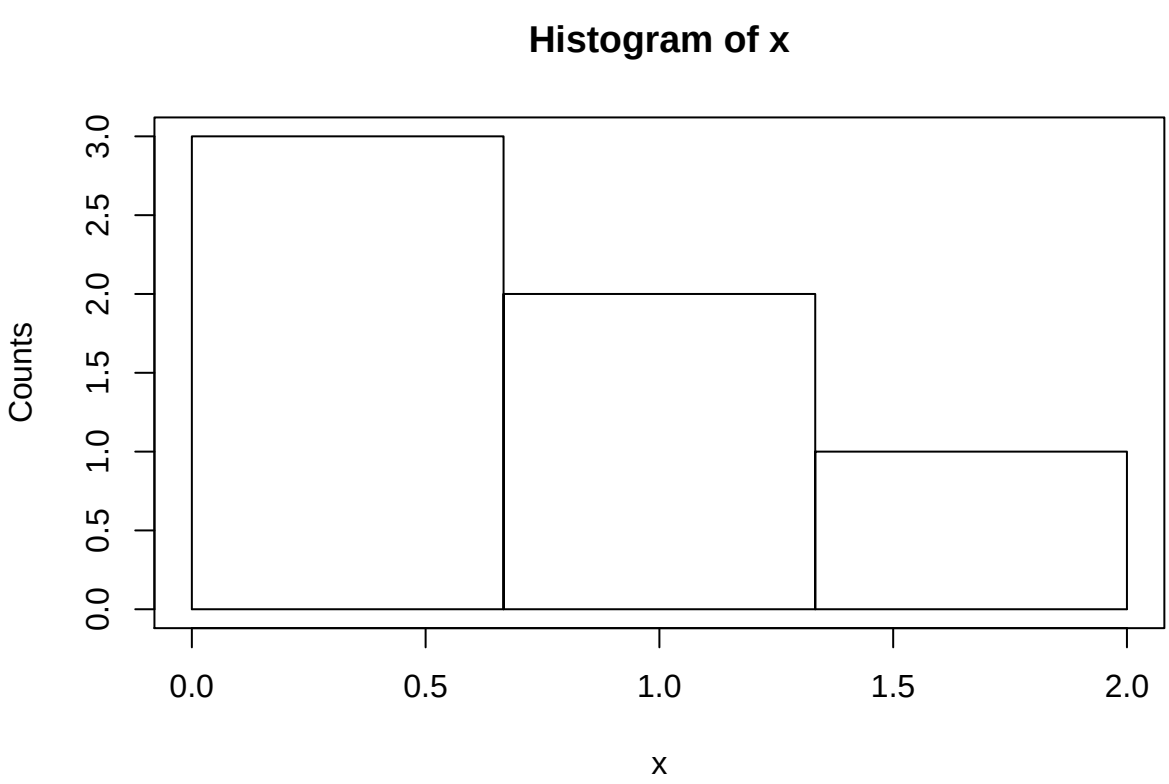
Question 1c

```
set.seed(100)
num = c(rnorm(100, -1,1), rnorm(100, 1,1))
histo(num, 10)
```



Question 1d

```
x = c(0,0,0,1,1,2)
histo(x,3)
```


Histogram of x
Counts
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0.0
0.5
1.0
1.5
2.0
x

Question 2a

```
library(rworldmap)
```

```
## Loading required package: sp
```

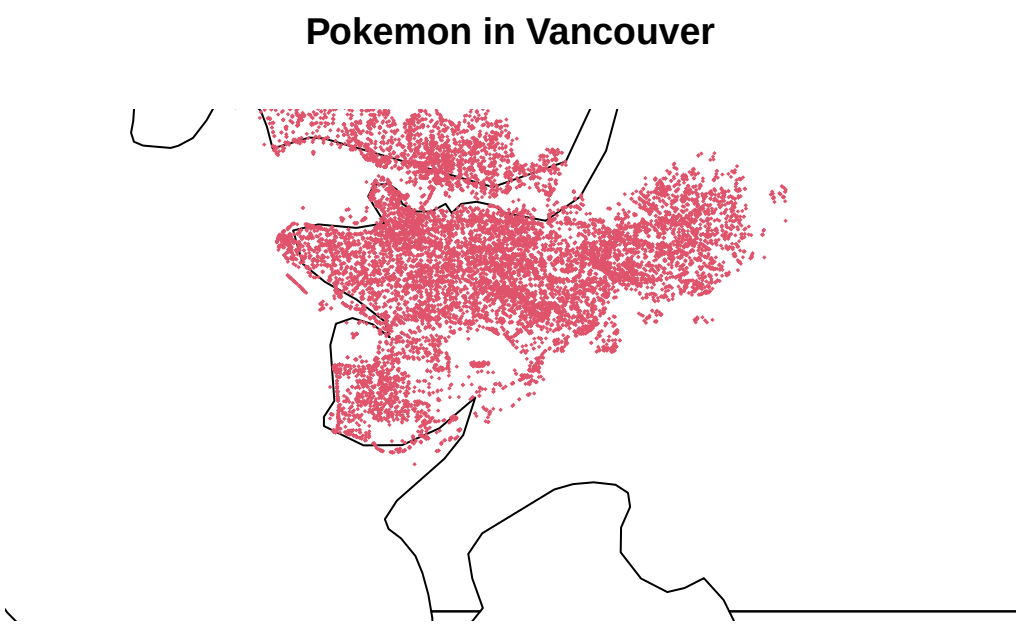
```
## ### Welcome to rworldmap ###
```

```
## For a short introduction type :   vignette('rworldmap')
```

```
library(rworldxtra)
library(MASS)
library(sp)
library(RSQLite)
library(DBI)
worldmap = getMap(resolution = "high")
NrthAm = worldmap[which(worldmap$REGION =="North America"),]
plot(NrthAm, xlim=c(-123.35,-122.65),
     ylim=c(49,49.35), main = "Pokemon in Vancouver")
```

```
## Warning in wkt(obj): CRS object has no comment
```

```
con = dbConnect(SQLite(), dbname="C:/Users/John/Desktop/STAT 240/Data/lab03.sqlite")
qry = "SELECT latitude, longitude FROM Vanpoke"
p = dbGetQuery(con,qry)
points(x=p$longitude, y=p$latitude, pch = 18, col= 2, cex = 0.3)
```

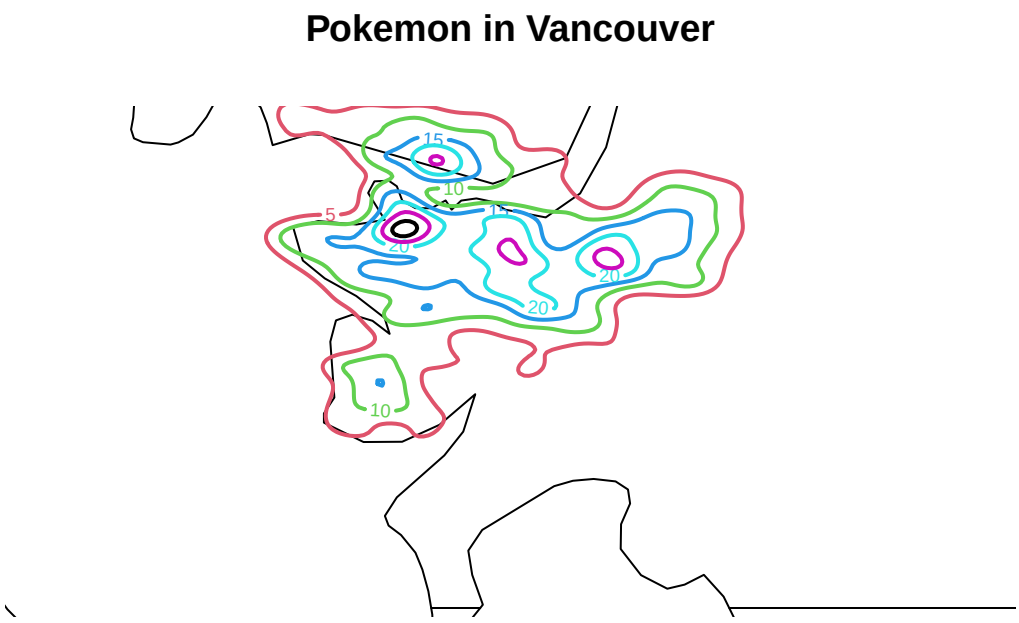


Question 2b

```
plot(NrthAm, xlim=c(-123.35,-122.65),
     ylim=c(49,49.35), main = "Pokemon in Vancouver")
```

```
## Warning in wkt(obj): CRS object has no comment
```

```
est2 = kde2d(x=p$longitude, y=p$latitude,n = c(121,150))
contour(est2, add=TRUE,col=c(1,2,3,4,5,6),lwd=2)
```



Question 2c
The peaks of the density plot are within those black/purple regions. Those areas have the highest density/probability. Density level from high to low : black -> purple -> cyan - > blue -> green ->red.