University of California, Los Angeles
Department of Statistics

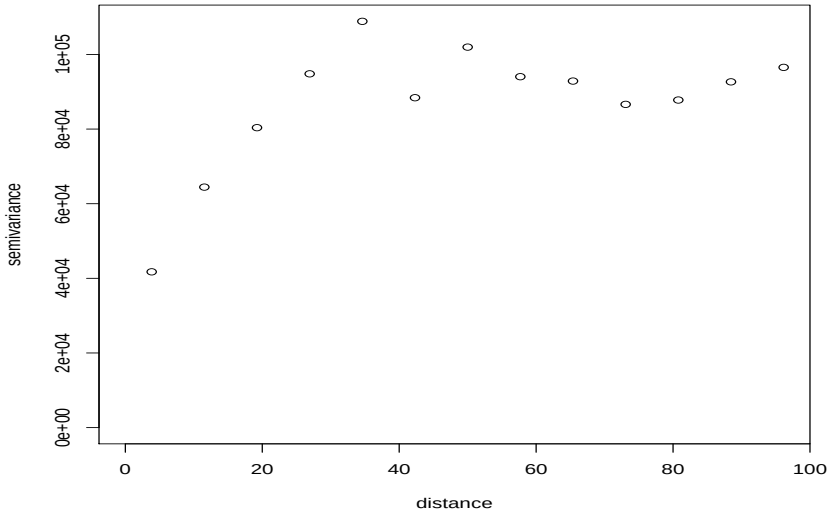
Statistics C173/C273 **Instructor: Nicolas Christou**

Geometric anisotropy

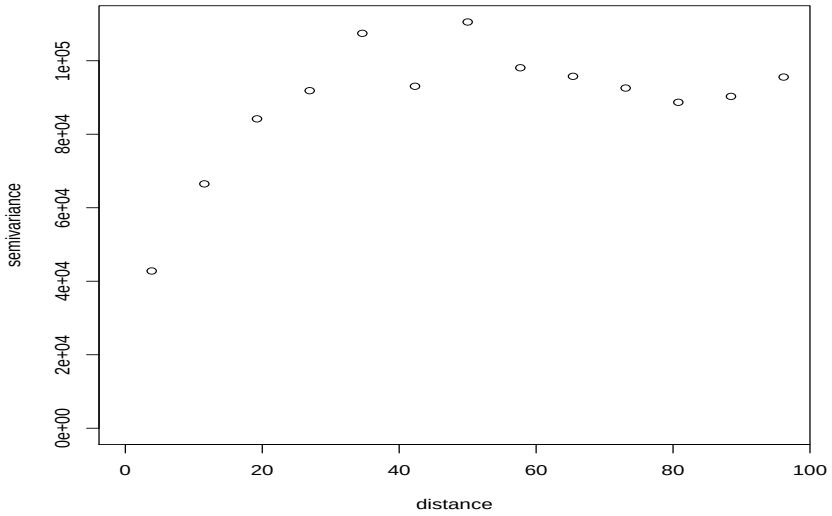
Access the variable V of the Walker Lake data set:

```
a1 <- read.table("http://www.stat.ucla.edu/~nchristo/statistics_c173_c273/
      walker_lake_v.txt", header=TRUE)
```

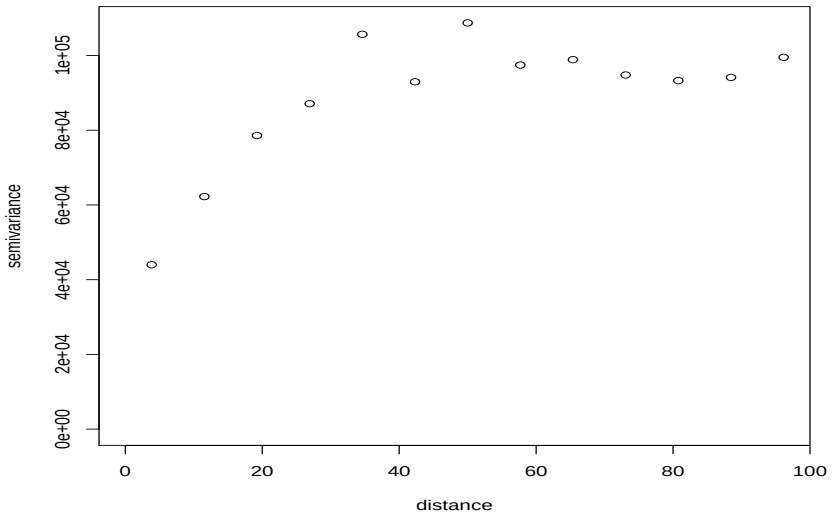
Direction $\frac{\pi}{2}$



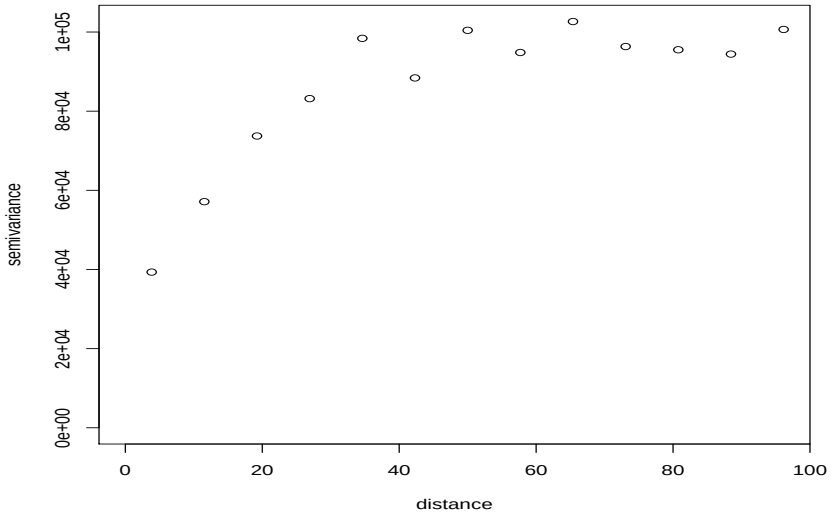
Direction $\frac{\pi}{2.57}$



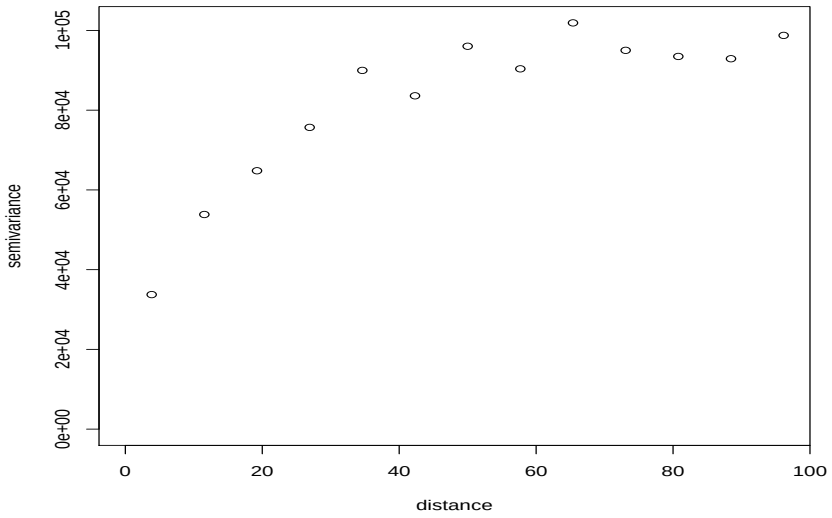
Direction $\frac{\pi}{3.6}$



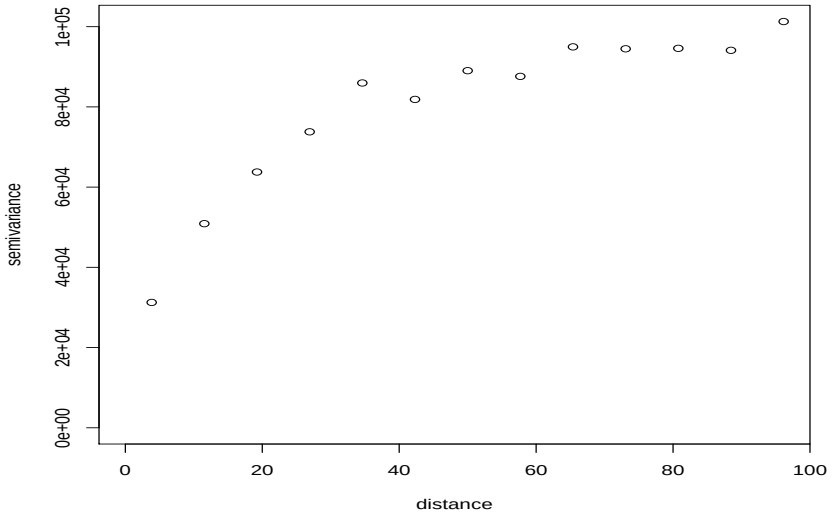
Direction $\frac{\pi}{6}$



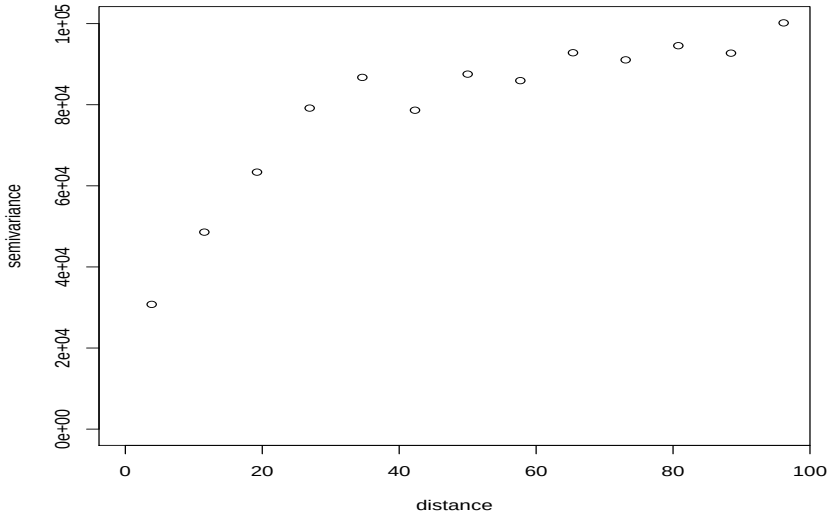
Direction $\frac{\pi}{18}$



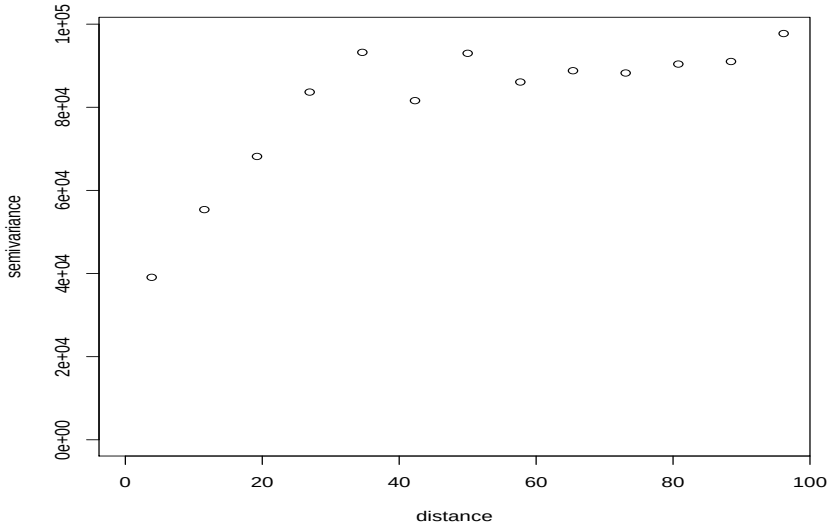
Direction 0.944π



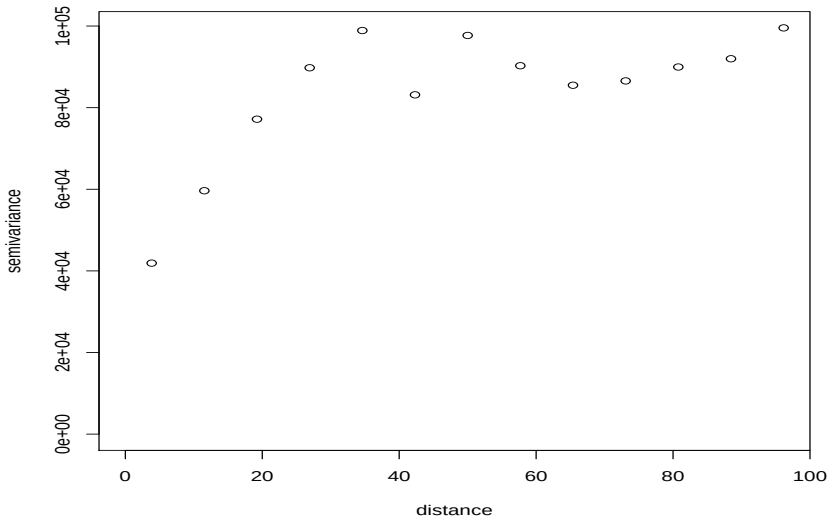
Direction 0.833π



Direction 0.722π



Direction 0.611π




```
#Detection of geometric anisotropy:
#Access the variable V of the Walker Lake data set:

a1 <- read.table("http://www.stat.ucla.edu/~nchristo/statistics_c173_c273/
      walker_lake_v.txt", header=TRUE)

library(geoR)

b1 <- as.geodata(a1)


#Compute the variogram for the following directions:
var1 <- variog(b1, dir=pi/2, tol=pi/4, max.dist=100)
var2 <- variog(b1, dir=pi/2.57, tol=pi/4, max.dist=100)
var3 <- variog(b1, dir=pi/3.6, tol=pi/4, max.dist=100)
var4 <- variog(b1, dir=pi/6, tol=pi/4, max.dist=100)
var5 <- variog(b1, dir=pi/18, tol=pi/4, max.dist=100)
var6 <- variog(b1, dir=0.944*pi, tol=pi/4, max.dist=100)
var7 <- variog(b1, dir=0.833*pi, tol=pi/4, max.dist=100)
var8 <- variog(b1, dir=0.722*pi, tol=pi/4, max.dist=100)
var9 <- variog(b1, dir=0.611*pi, tol=pi/4, max.dist=100)

#Plot the variograms:
plot(var1, ylim=c(0,120000))
plot(var2, ylim=c(0,120000))
plot(var3, ylim=c(0,120000))
plot(var4, ylim=c(0,120000))
```

```
plot(var5, ylim=c(0,120000))
plot(var6, ylim=c(0,120000))
plot(var7, ylim=c(0,120000))
plot(var8, ylim=c(0,120000))
plot(var9, ylim=c(0,120000))

#From the plots above approximately find the distance at which the variograms
#reach the value of 80000:

#Compute the coordinates:
theta <- c(0, pi/9, pi/4.5, pi/3, pi/2.25, pi/18, pi/6, pi/3.6, pi/2.571)
range <- c(18.5, 17.9, 19.8, 23.2, 29.9, 32.9, 29.3, 25.8, 21.4)

x1 <- cos(theta[1:5])*range[1:5]
y1 <- sin(theta[1:5])*range[1:5]

x2 <- range[6:9]*sin(theta[6:9])
y2 <- -range[6:9]*cos(theta[6:9])

x11 <- -x1
y11 <- -y1

x22 <- -x2
y22 <- -y2

plot(x1,y1, xlim=c(-30,30), ylim=c(-35,35), xaxt="n", yaxt="n",
     ylab="y", xlab="x")

points(x11,y11)
points(x2,y2)
points(x22,y22)

segments(x1,y1, x11, y11)
segments(x2,y2, x22, y22)

segments(0, -34.8, 0, 34.8, lty=2)
segments(-28, 0, 28, 0, lty=2)
```

Construction of rose diagram: