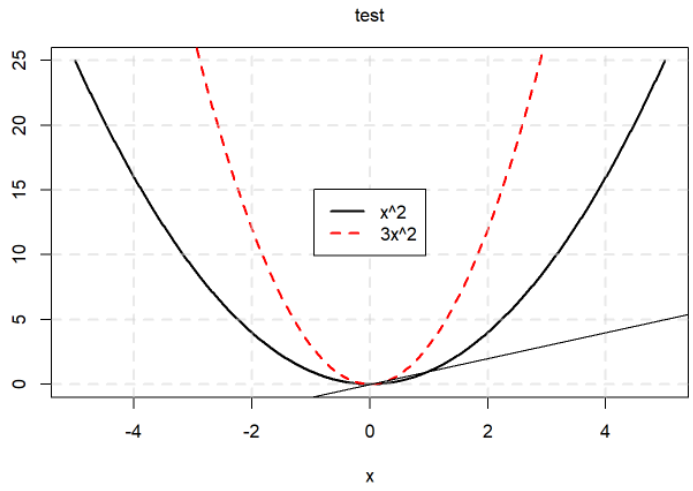
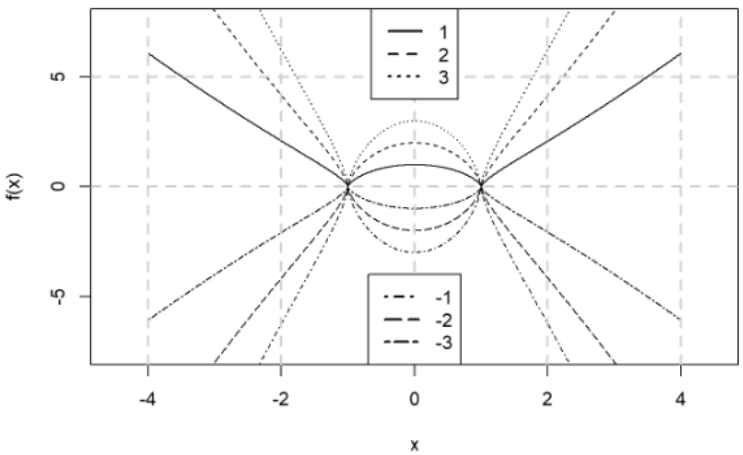
使用 R 繪製各種統計涵數圖

```
xv<-seq(-5,5,0.01)
yv<-xv^2
plot(xv,yv,type="l",xlab="x",ylab="",lwd=2)
points(xv,3*xv^2,type="l",col="red",lty=2,lwd=2)
abline(h=seq(0,25,5),v=seq(-4,4,2),lty=2,col="#D3D3D380",lwd=2)
abline(0,1)#y=1*x+0
#Legend(0,20,Legend=c("x^2","3x^2"))
legend("center",legend=c("x^2","3x^2"),lty=c(1,2),col=c("black","red"),lwd=2)
mtext("test",3,1)
```




```
f<-function(x, a){
  a*((x^2-1)^(2))^(1/3)
}
xv<-seq(-4,4,0.01)
plot(0,xlab="x",ylab="f(x)",xlim=c(-4.5,4.5),ylim=c(-7.5,7.5),type="n")
points(xv,f(xv,a=1),col=1,lty=1,type="l")
points(xv,f(xv,a=2),col=1,lty=2,type="l")
points(xv,f(xv,a=3),col=1,lty=3,type="l")
points(xv,f(xv,a=-3),col=1,lty=4,type="l")
points(xv,f(xv,a=-2),col=1,lty=5,type="l")
points(xv,f(xv,a=-1),col=1,lty=6,type="l")
abline(h=seq(0,25,5),v=seq(-4,4,2),lty=2,col="#D3D3D3",lwd=2)
legend("top",legend=c("1","2","3"),lty=c(1,2,3),lwd=2)
legend("bottom",legend=c("-1","-2","-3"),lty=c(4,5,6),lwd=2)
```

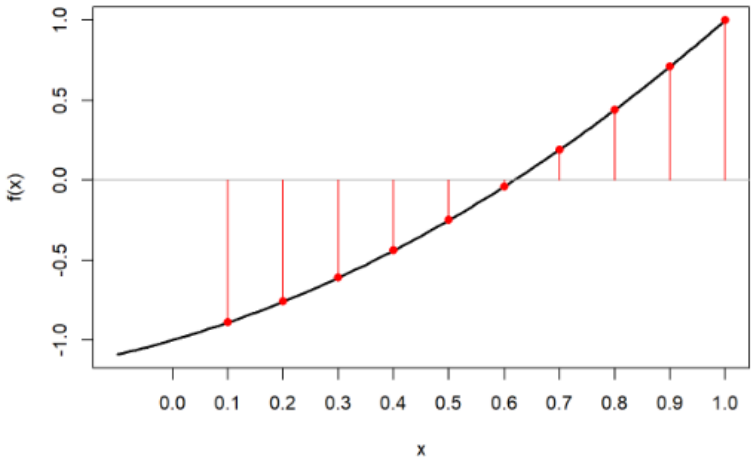


##1.5-1.10

```r
#有一函數 f(x) = x2 + x - 1, 其定義域為 (0, 1)，請將 (0, 1) 等分為 10 份子區間，將每一子區間之右端點所形成的集合稱為 x，請計算 x 之函數值 f(x)。
f<-function(x) x^2+x-1
gap<- seq(0,1,length=11)
x<-gap[2:11]
f(x)
```

```
##  [1] -0.89 -0.76 -0.61 -0.44 -0.25 -0.04  0.19  0.44  0.71  1.00
```

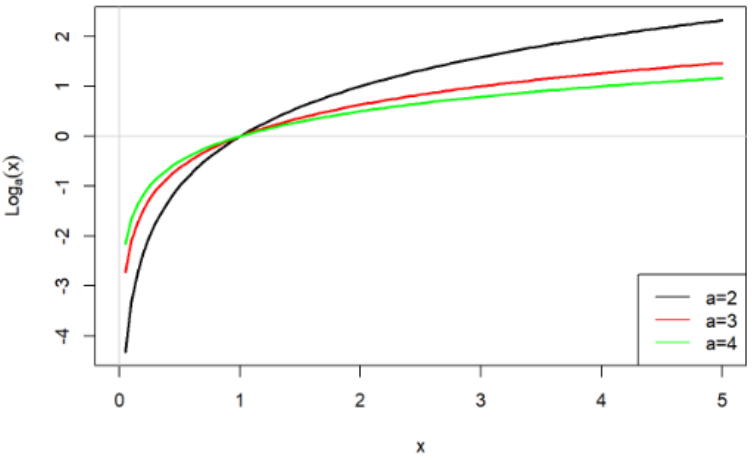
```r
curve(f(x),-0.1,1,lwd=2,xaxt="n")
abline(h=0,col="gray70")
axis(1,gap)
points(x,f(x),col="#FF0000",pch=16)
points(x,f(x),col="#FF0000",type="h")
```



##1.47

##3.1

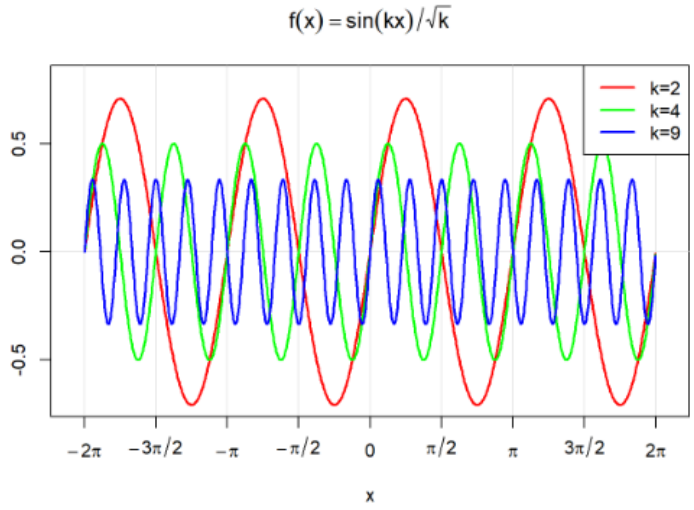
```r
# 畫出 y = Loga(x) x > 0 之圖形。
curve(logb(x,2),0,5,ylab=expression(Log[a](x)),lwd=2)
abline(h=0,v=0,col="lightgray")
curve(logb(x,3),lwd=2,add=TRUE,col="red")
curve(logb(x,4),lwd=2,add=TRUE,col="green")
legend("bottomright",paste("a=",c(2,3,4),sep=""),col=c("black","red","green"),lty=1)
```



##3.2

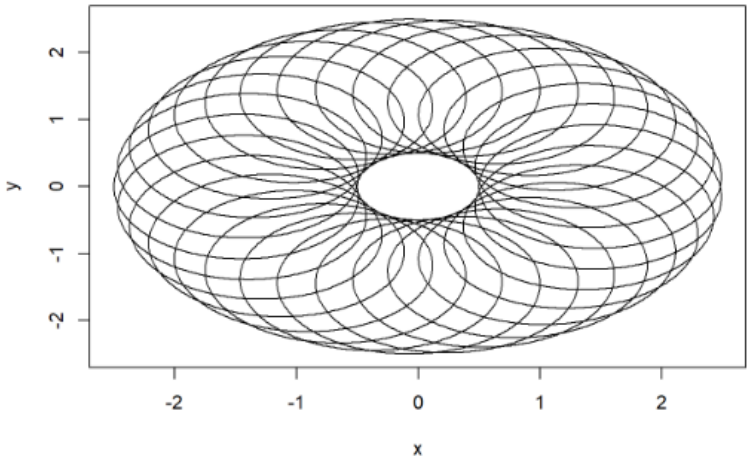
```r
#若有一函數為 f(x) = sin(kx)/√k，畫出當 k = 2、4、9 時之函數圖形（需以不同顏色呈現）。
f<-function(x,k){
  #x<-pi/4;k<-1
  sin(k*x)/sqrt(k)
}

xv<- seq(-2*pi,2*pi,0.01)
plot(0,xaxt="n",xlab="x",ylab="",main=expression(f(x)==sin(k*x)/sqrt(k)),type="n",xlim=c(-6.5,6.5),ylim=c(-0.7,0.8))
abline(h=0,v=seq(-5/2*pi,5/2*pi,1/2*pi),col="#D3D3D380")
labtext<-expression(-2*pi,-3*pi/2,-pi,-pi/2,0,pi/2,pi,3*pi/2,2*pi)
axis(1,labtext,at=seq(-4/2*pi,4/2*pi,1/2*pi))
points(xv,f(xv,k=2),col="#FF0000",lwd=2,type="l")
points(xv,f(xv,k=4),col="#00FF00",lwd=2,type="l")
points(xv,f(xv,k=9),col="#0000FF",lwd=2,type="l")
legend("topright",legend=paste("k=",c(2,4,9),sep=""),lty=1,lwd=2,col=c("#FF0000","#00FF00","#0000FF"))
```



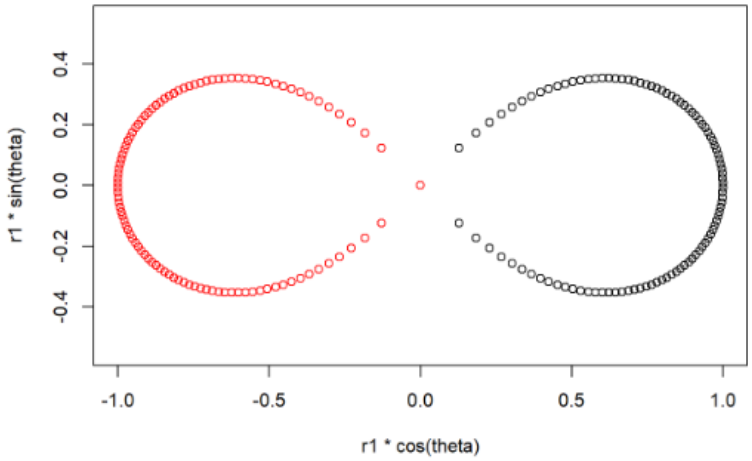
##3.3

```r
theta<-seq(0,2*pi,length.out=10000)
xv<-1.5*cos(theta)-cos(30*theta)
yv<-1.5*sin(theta)-sin(30*theta)
plot(xv,yv,type="l",xlab="x",ylab="y")
```



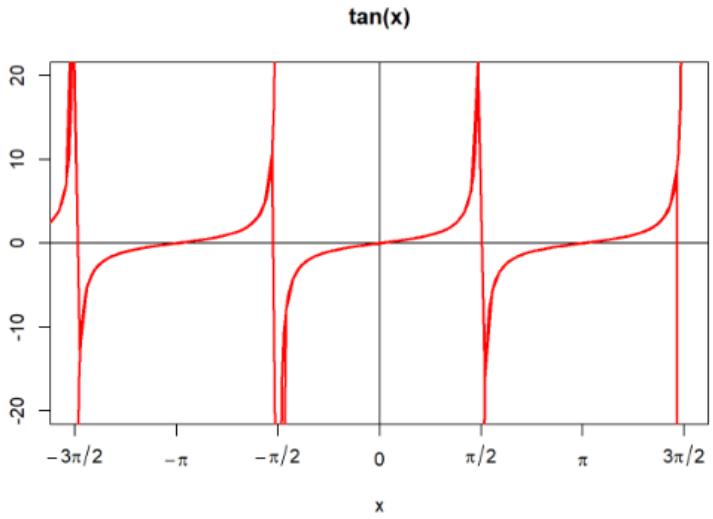
##3.36

```
r1<-sqrt(cos(2*theta))
r2<- -r1
plot(r1*cos(theta),r1*sin(theta),asp=1,xlim=c(-1,1))
points(r2*cos(theta),r2*sin(theta),col="red")
```



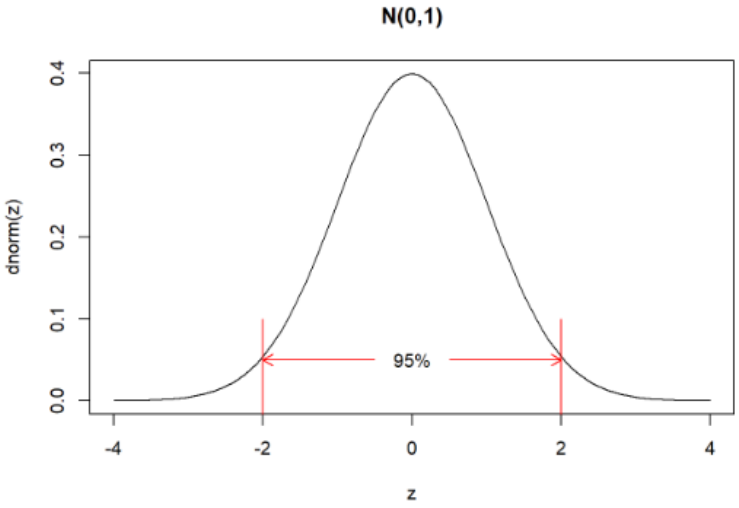
##3.6

```
#畫出 tan 函數如下圖。(提示 1: plot, curve, axis)(提示 2: points.at <- c(-2*pi, -3*pi/2, -pi/2, pi/2, 3*pi/2, 2*pi))
plot(0,xlim=c(-3*pi/2,3*pi/2),ylim=c(-20,20),type="n",xlab="x",ylab="",xaxt="n",main="tan(x)")
abline(h=0,v=0)
labeltxt<-c(expression(-3*pi/2),expression(-pi),expression(-pi/2),0,expression(pi/2),expression(pi),expression(3*pi/2))
axis(1,labels=labeltxt,at=seq(-3*pi/2,3*pi/2,pi/2))
curve(tan(x),-2*pi,-3/2*pi-0.0001,add=TRUE,col="red",lwd=2)
curve(tan(x),-3/2*pi,-1/2*pi-0.0001,add=TRUE,col="red",lwd=2)
curve(tan(x),-1/2*pi,1/2*pi,add=TRUE,col="red",lwd=2)
curve(tan(x),1/2*pi+0.0001,3/2*pi,add=TRUE,col="red",lwd=2)
curve(tan(x),3/2*pi+0.0001,-2*pi,add=TRUE,col="red",lwd=2)
```



##3.9

```
curve(dnorm(x),-4,4,xlab="z",ylab="dnorm(z)",main="N(0,1)")
segments(-2,0.1,-2,-0.1,col="red")
segments(2,0.1,2,-0.1,col="red")
text(0,0.05,"95%")
arrows(-0.5,0.05,-2,0.05,col="red",length=0.1)
arrows(0.5,0.05,2,0.05,col="red",length=0.1,code=2)
```



##3.10