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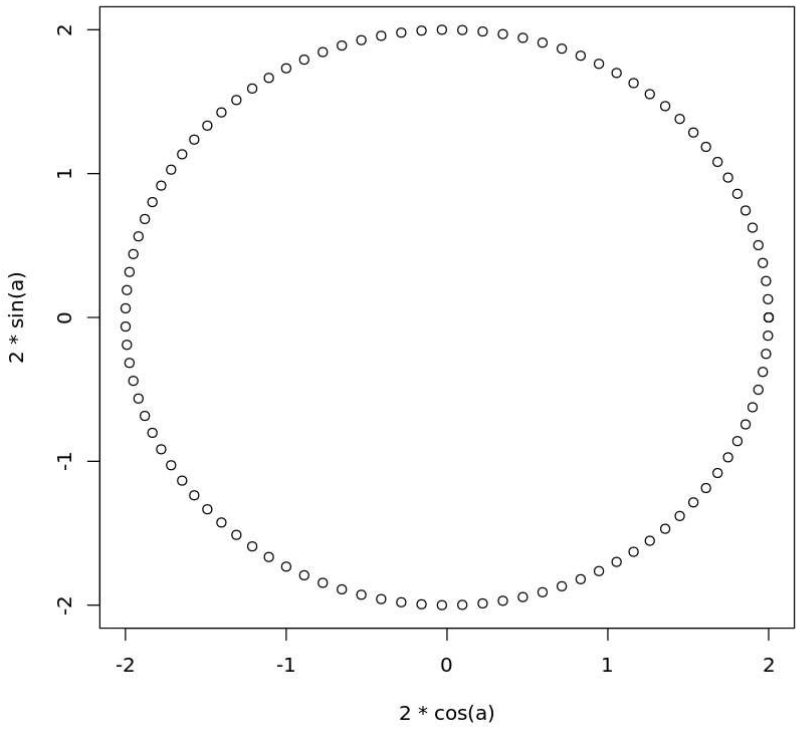
LAB PROGRAM 8

1. Plot a circle by (x,y) points, where x = r · cos(a) and y = r · sin(a), with a the angle, from 0 to 2π, and r the radius.

In [4]:

```
a <- seq(0,2*pi, length.out = 100)
plot(x= 2*cos(a),y= 2*sin(a))   # here 2 is the radius
```

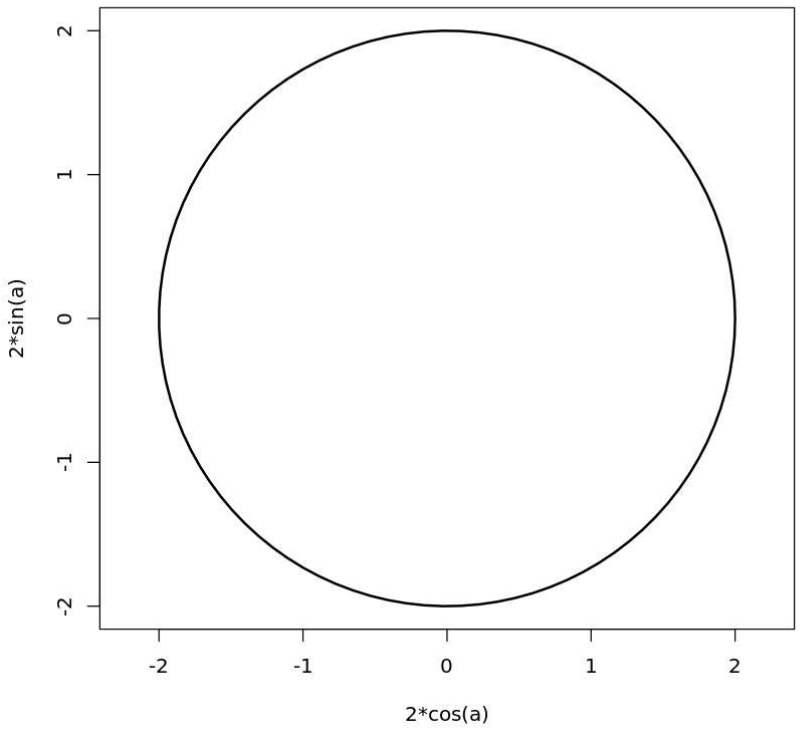


2. Using the same plot, add a number of graphical parameters that specify:

- **Rather than dots, the points should be connected by lines (type).**
- **The line should be twice as wide as the default (lwd).**
- **Give the appropriate x- and y-axes labels (xlab, ylab).**
- **Give the axes and axes annotations (axes).**
- **The graph has to be symmetrical, i.e. the x/y aspect ratio = 1 (asp).**
- **Add the legend, that describe the cure.**

In [5]:

```
plot(2*cos(a), 2*sin(a), type = "l", lwd = 2, xlab = "2*cos(a)", ylab="2*sin(a)", axes = TR
```

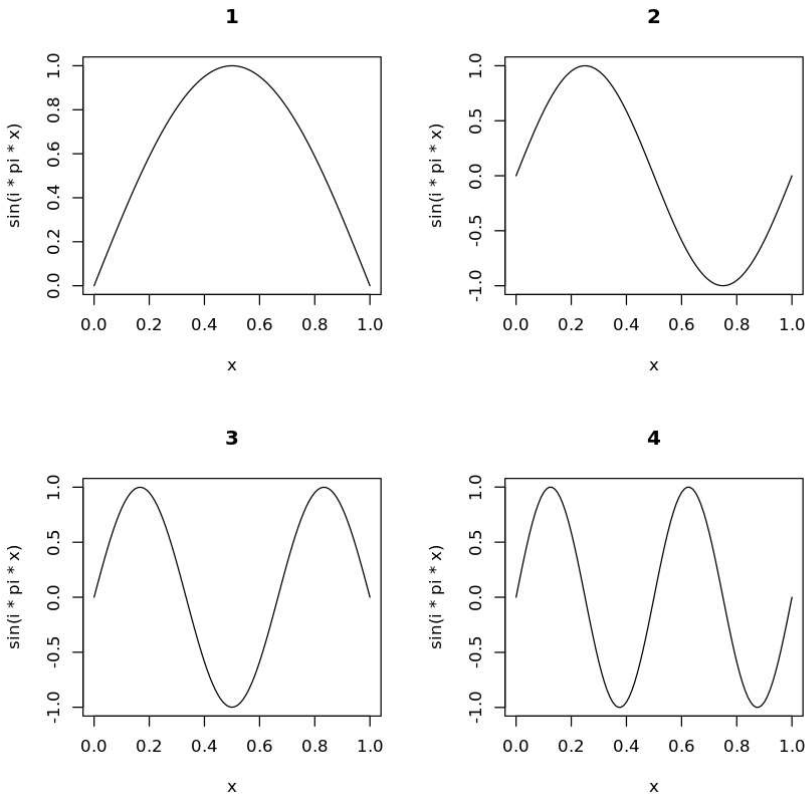


3. Explore for plotting multiple figures in a single window with partition as par() command as follows

```
par (mfrow=c(2,2))
for ( i in 1:4) curve(sin(ipix),0,1,main=i)
```

In [7]:

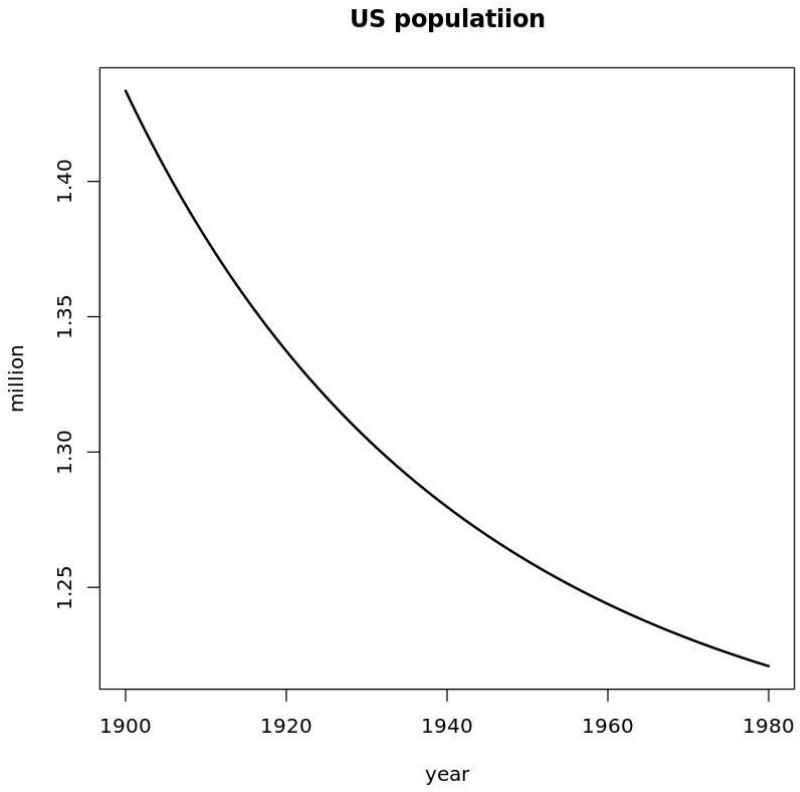
```
par(mfrow=c(2,2))
for(i in 1:4){
  curve(sin(i*pi*x),0,1,main=i)
}
```



4. For the US, the population density in 1900 (N0) was 76.1 million; the population growth can be described with parameter values: a=0.02 yr−1, K = 500 million of people.
Actual population values are:
1900 1910 1920 1930 1940 1950 1960 1970 1980
76.1 92.4 106.5 123.1 132.6 152.3 180.7 204.9 226.5
a) Plot the population density curve as a thick line, using the US parameter values.
b) Add the measured population values as points. Finish the graph with titles, labels etc.

In [8]:

```
k <- 500
no <- 76.1
a <- 0.02
curve(k/(1+((k-no)-no*exp(-a*(x-1900)))),1900,1980,main="US populatiion",xlab="year",ylab="
n <- matrix(ncol=2,data=c(seq(1900,1980,by=10), 76.1,92.4,106.5,123.1,132.6,152.3,180.7,204
points(n)
```



5. Plot curves for mathematical functions with following R-command ”curve”:

```
curve(sin(3pix))
curve(sin(3pix),from=0,to=2,col="blue", + xlab="x",ylab="f(x)",main="curve")
curve(cos(3pix),add=TRUE,col="red",lty=2) >abline(h=0,lty=2)
legend("bottomleft",c("sin","cos"),text.col=c("blue","red"),lty=1:2)
```

In [11]:

```
par(mfrow=c(2,2))
curve(sin(3*pi*x))
curve(sin(3*pi*x),from = 0,to=2,col="blue",xlab="x",ylab="f(x)",main="curve")

curve(cos(3*pi*x),add=TRUE,col="red",lty=2)
abline(h=0,lty=2)

legend("bottomleft",c("sin","cos"),text.col=c("blue","red"),lty=1:2)
```