

## Section 7: Visualizing contour plots and three dimensional plots

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Review of important functions covered in this section:

### Functions

image	Displays a color image
contour	Displays contour plot
filled.contour	Displays level plot
contourplot	Displays contour plot (lattice package)
levelplot	Displays level plot (lattice package)
persp	Displays perspective plot
wireframe	Displays wireframe surface plot (lattice package)
cloud	Displays 3D scatterplot (lattice package)
open3d	Set parameters (rgl package)
surface3d	Adds surface (rgl package)
plot3d	Displays 3D scatterplot (rgl package)
lines3d	Adds line (rgl package)
scatter3d	Displays 3D scatterplot (car package)
spplot	Plots spatial data (raster package)
rasterToPolygons	Converts raster to polygons (raster package)
dmvt	Multivariate t distribution (mvtnorm package)

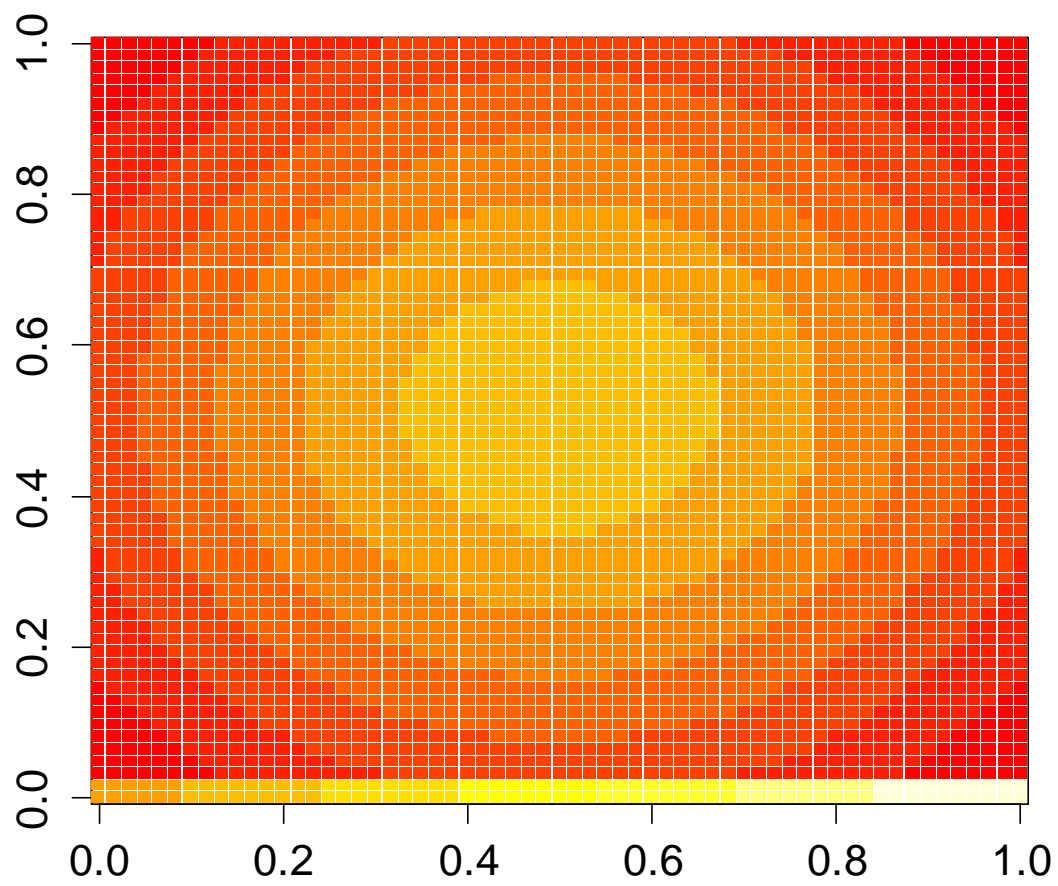
### Exercise

We'll use a simulated data using the following codes:

```
require(mvtnorm)
d1 = d2 = seq(-3,3,.1)
func = function(d1,d2){
  dmvt(cbind(d1,d2), sigma = diag(2), df = 9)
}
d3 = outer(d1,d2,func)
x = cbind(d1,d2,d3)
```

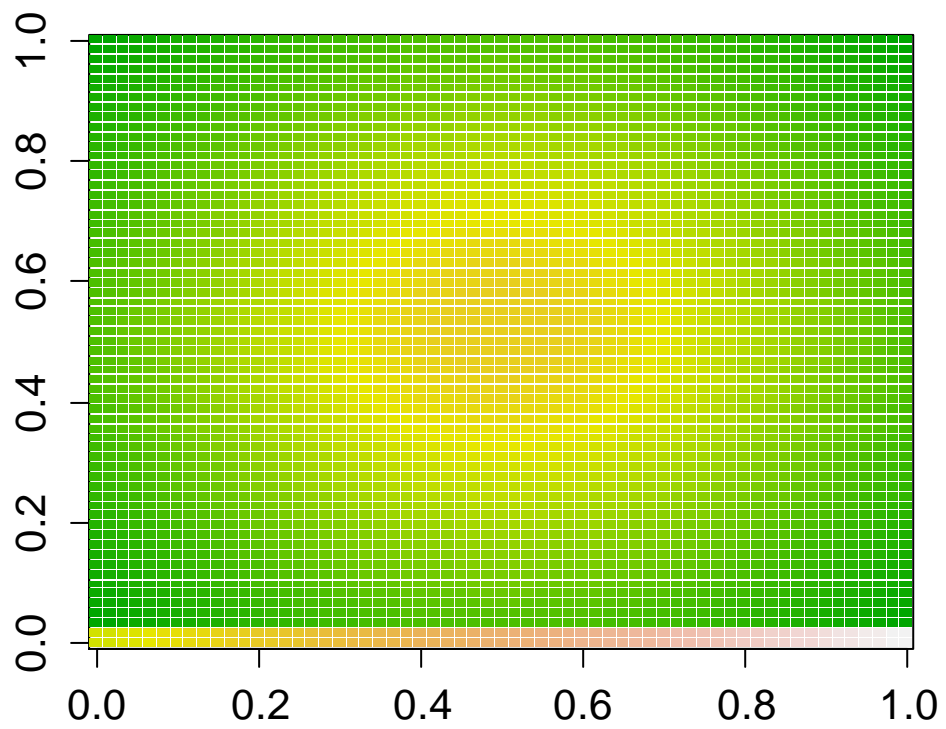
a. First draw an image of  $x$ .

`image(x)`

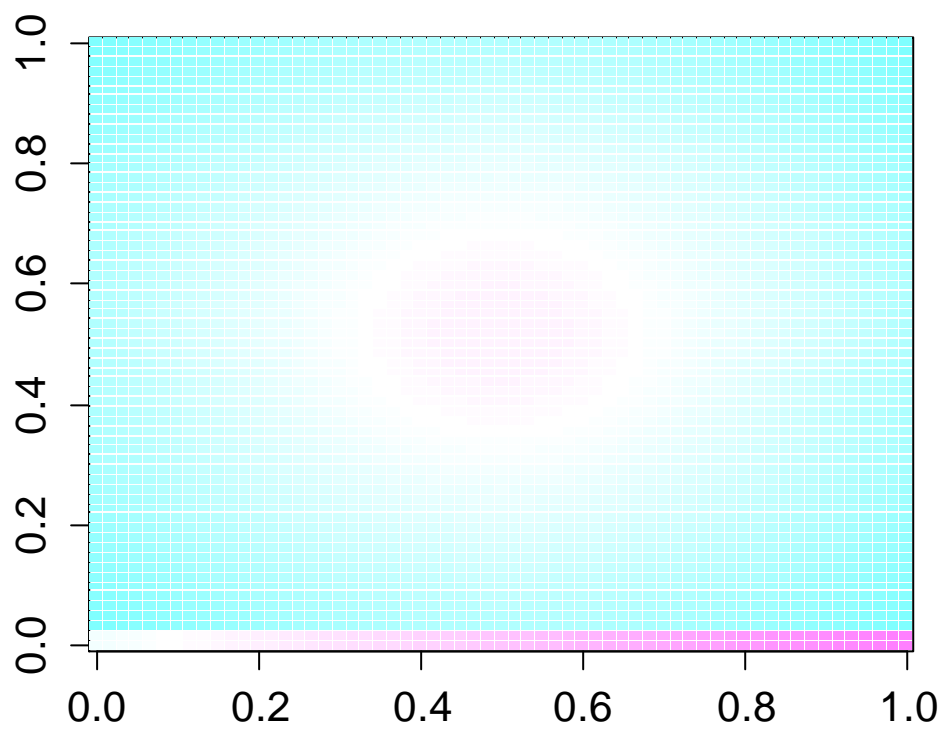


b. Get the image plot using terrain color palette.

```
image(x, col = terrain.colors(ncol(x)))
```

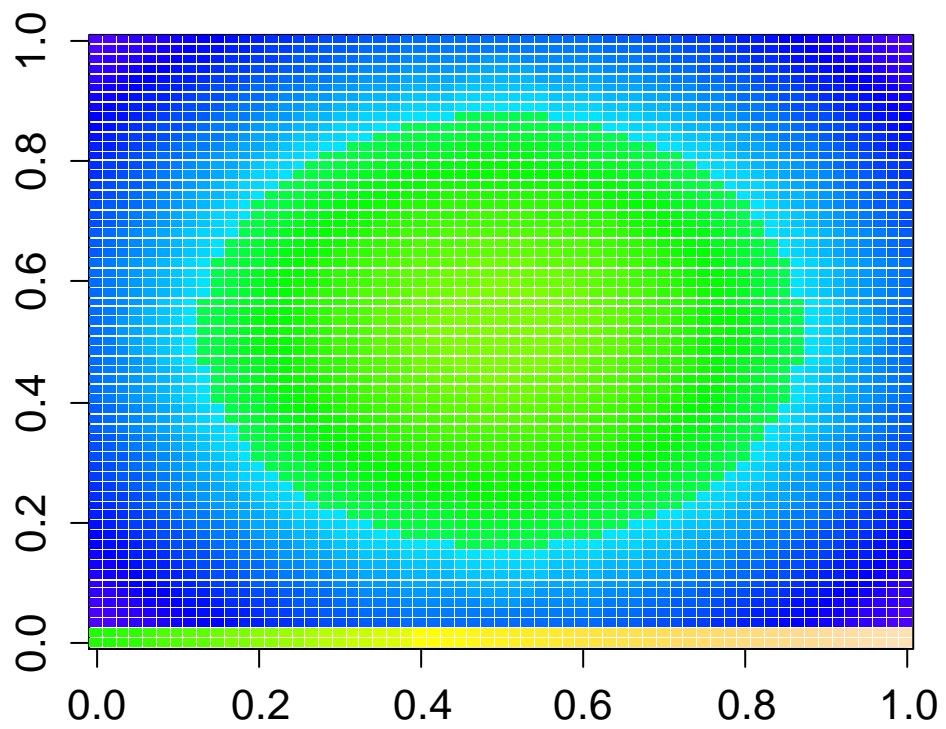


c. Get the image plot using cm color palette.  
`image(x, col = cm.colors(ncol(x)))`



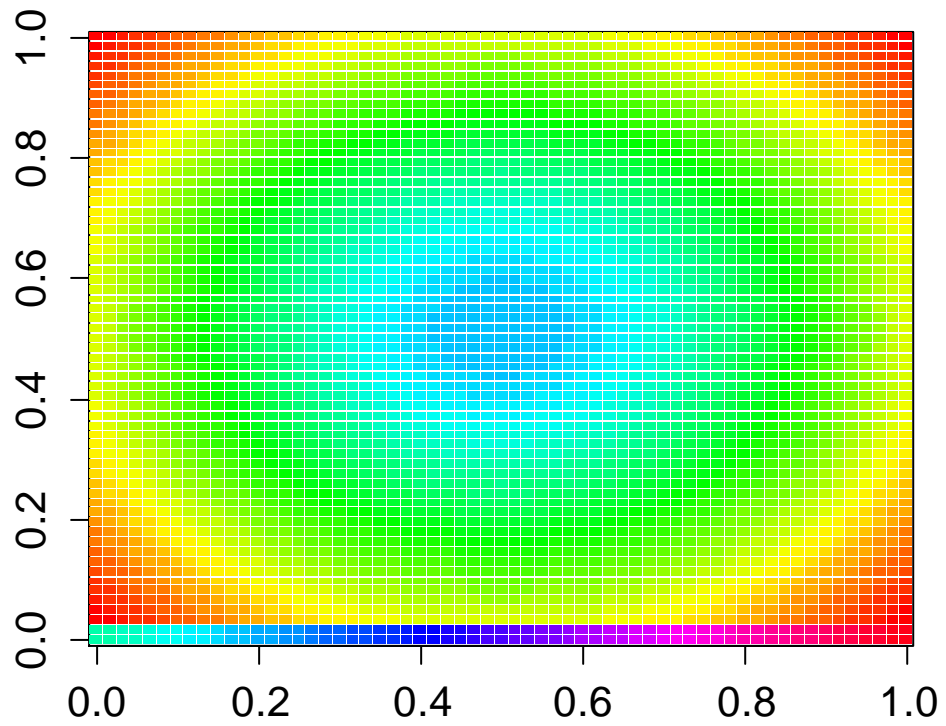
d. Get the image plot using topological color palette.

```
image(x, col = topo.colors(ncol(x)))
```



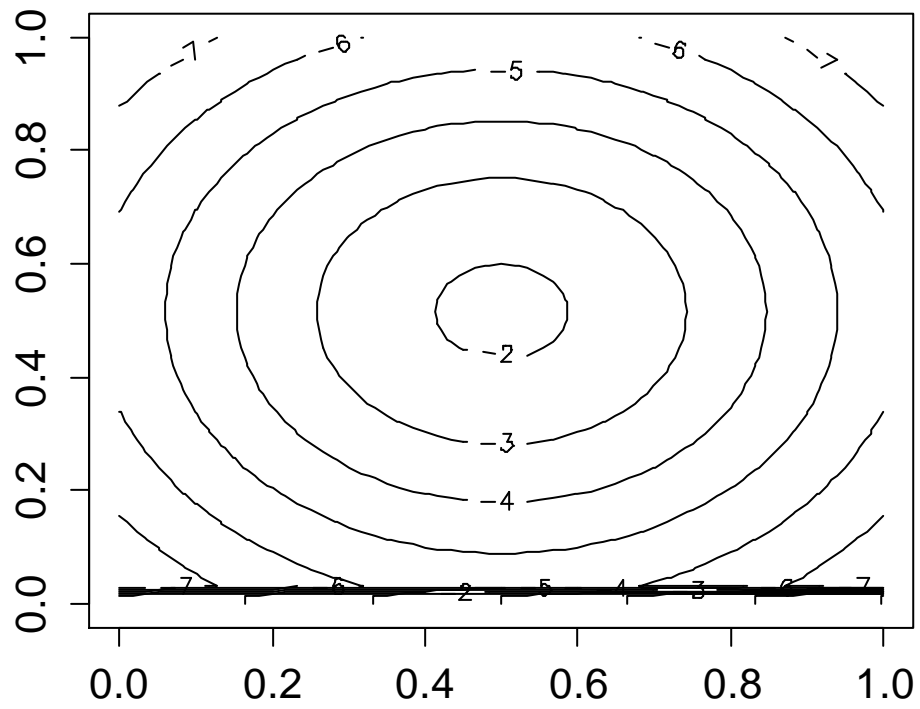
e. Get the image plot using rainbow color palette.

```
image(x, col = rainbow(ncol(x)))
```



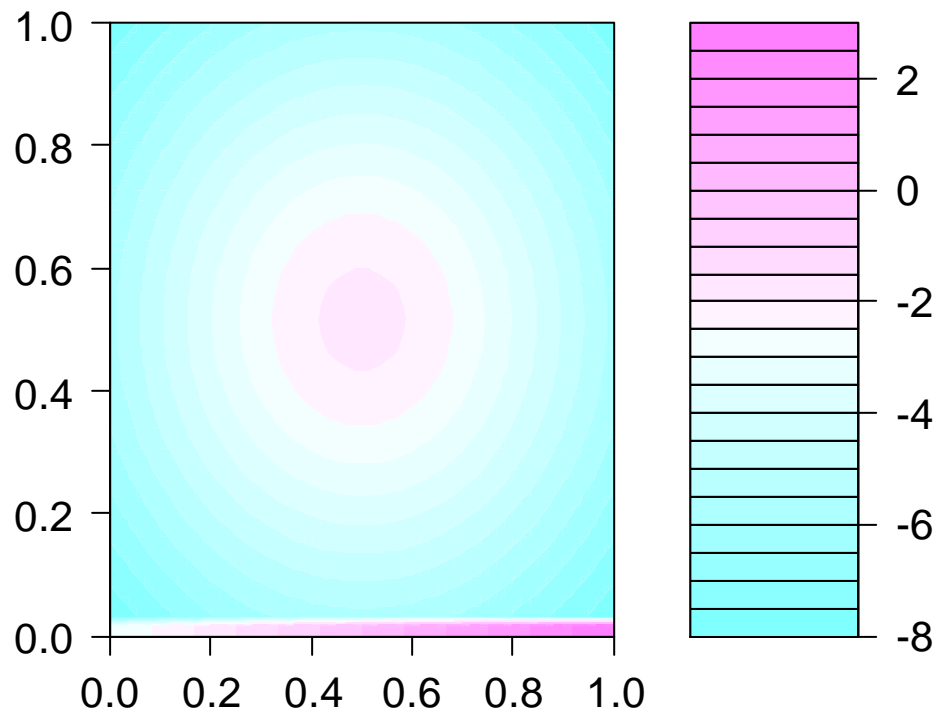
f. Draw a contour of  $x$ .

`contour(x)`



g. Draw a filled contour of  $x$ .

`filled.contour(x)`

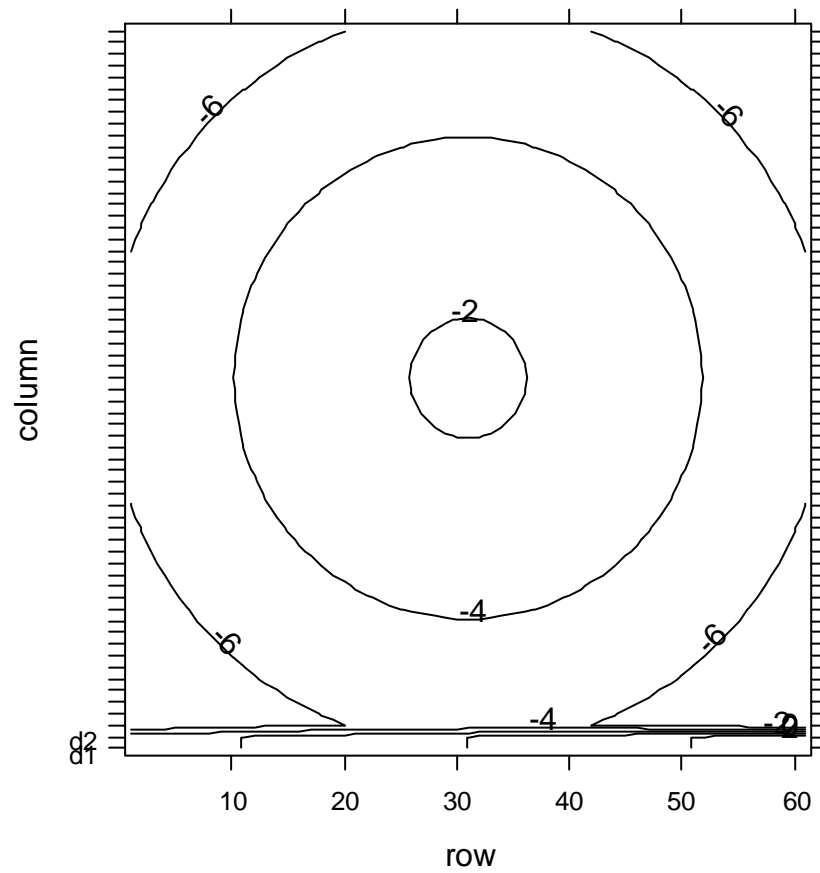




h. Draw a contour of  $x$  using lattice package.

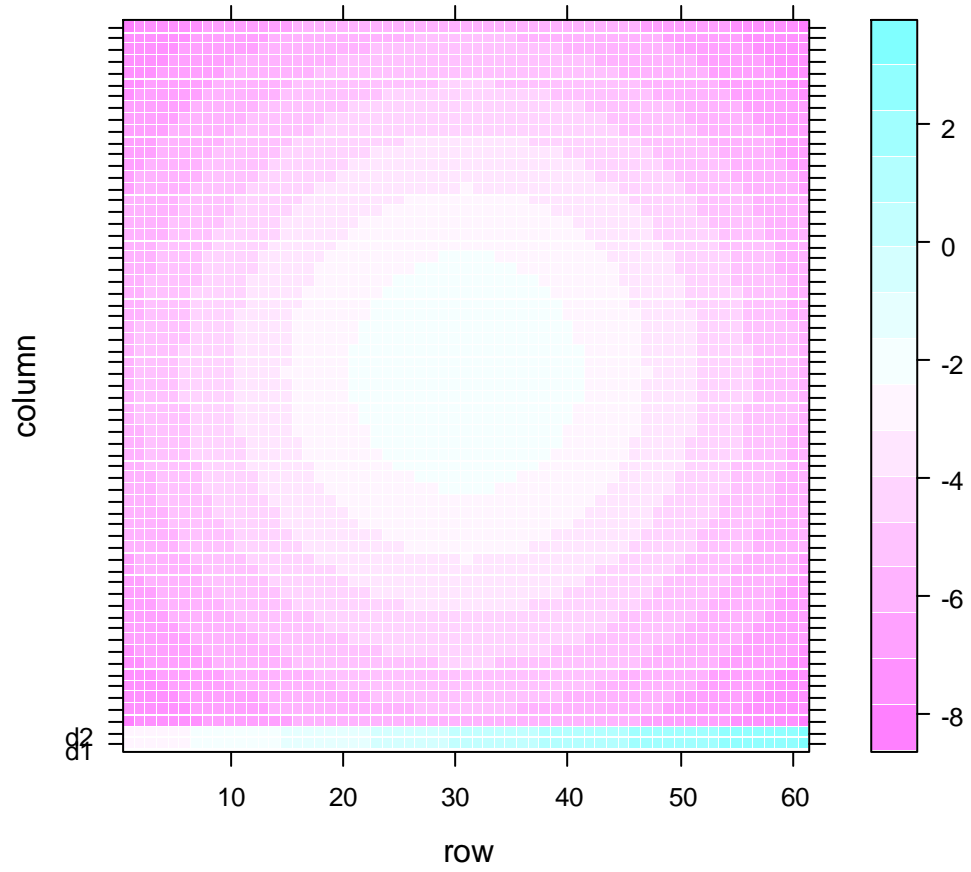
```
require(lattice)
```

```
contourplot(x)
```



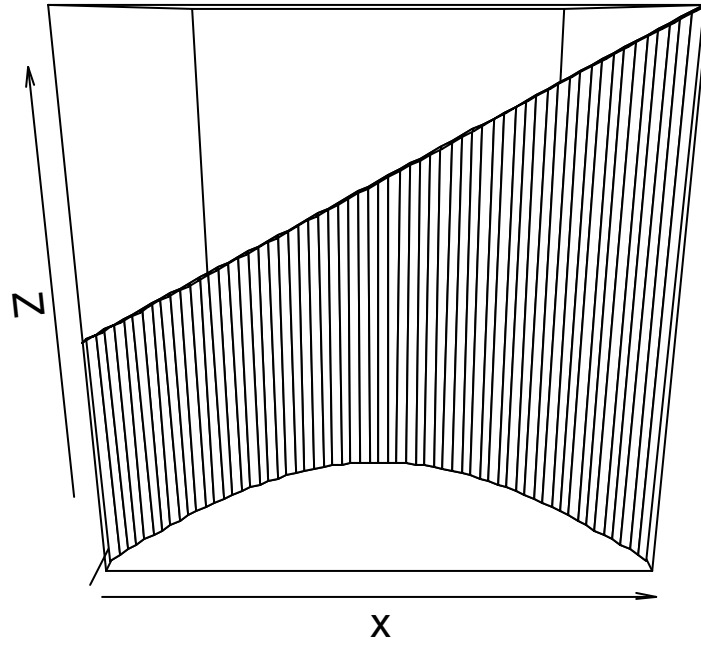
- i. Draw a level plot of  $x$ .

`levelplot(x)`



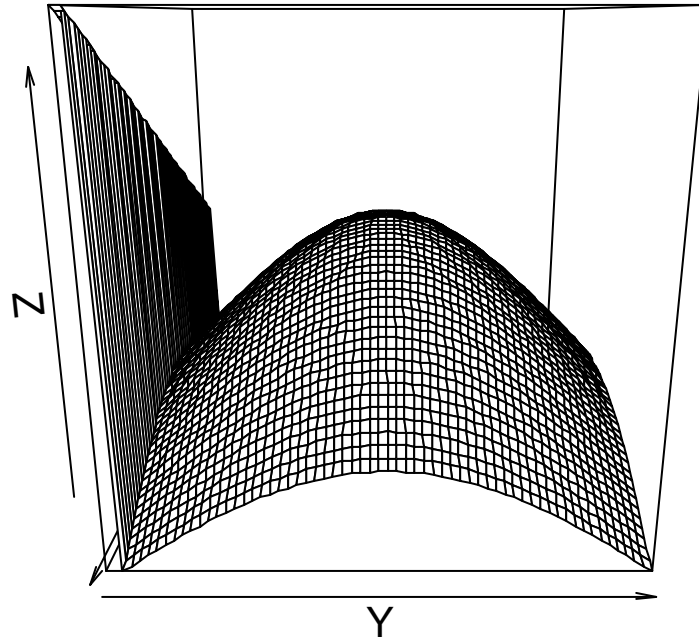
- j. Draw a perspective plot of  $x$ .

**persp(x)**



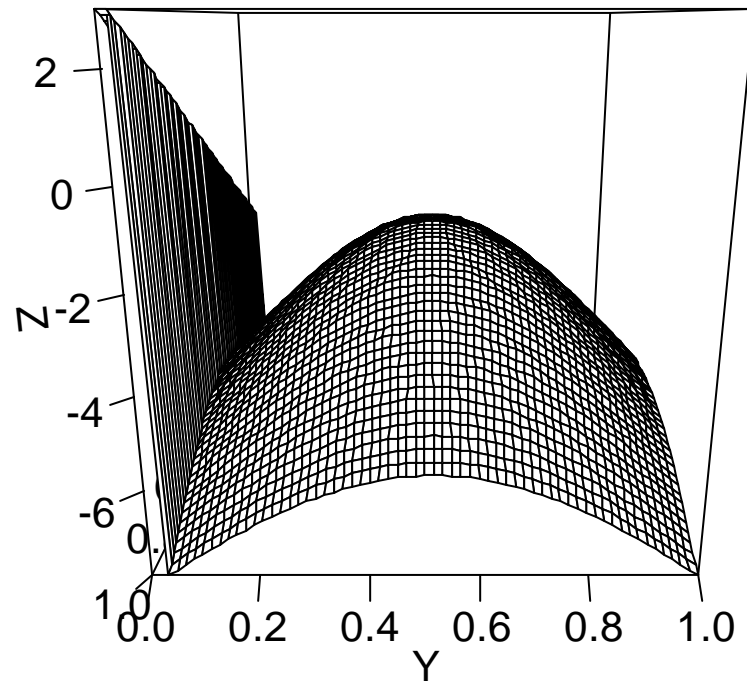
k. Draw a perspective plot of  $x$  with azimuthal direction being 90 degree.

```
persp(x, theta = 90)
```



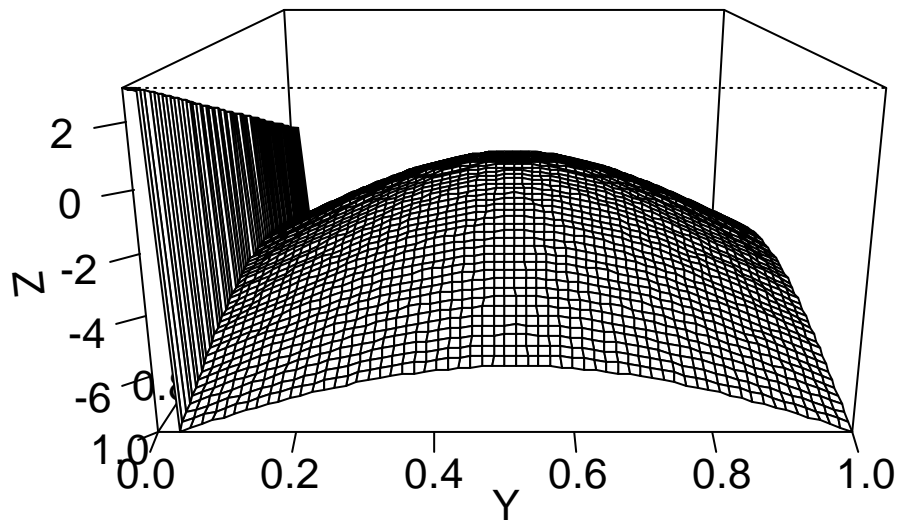
I. Add detailed ticks in the above plot.

```
persp(x, theta = 90, ticktype = "detailed")
```



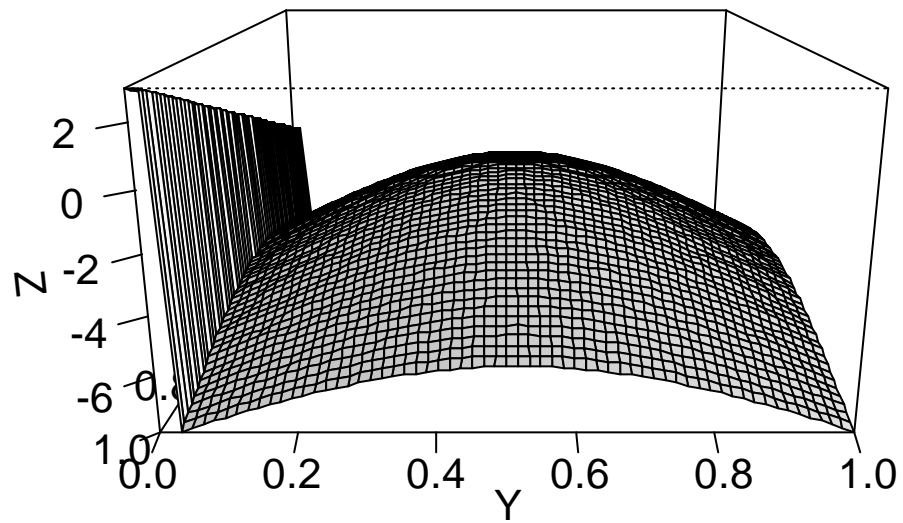
m. Expand the above plot by 0.5 unit.

```
persp(x, theta = 90, ticktype = "detailed", expand = .5)
```



n. Shade the above plot 20%.

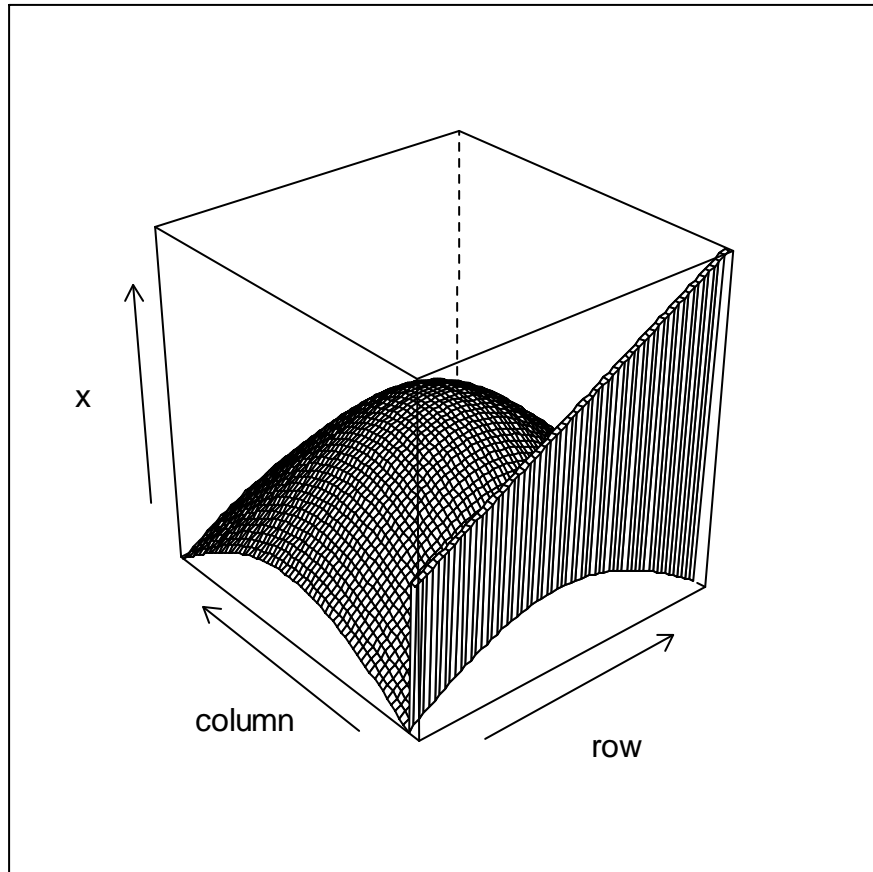
```
persp(x, theta = 90, ticktype = "detailed", expand = .5, shade  
= .2)
```



o. Draw a wireframe.

```
require(lattice)
```

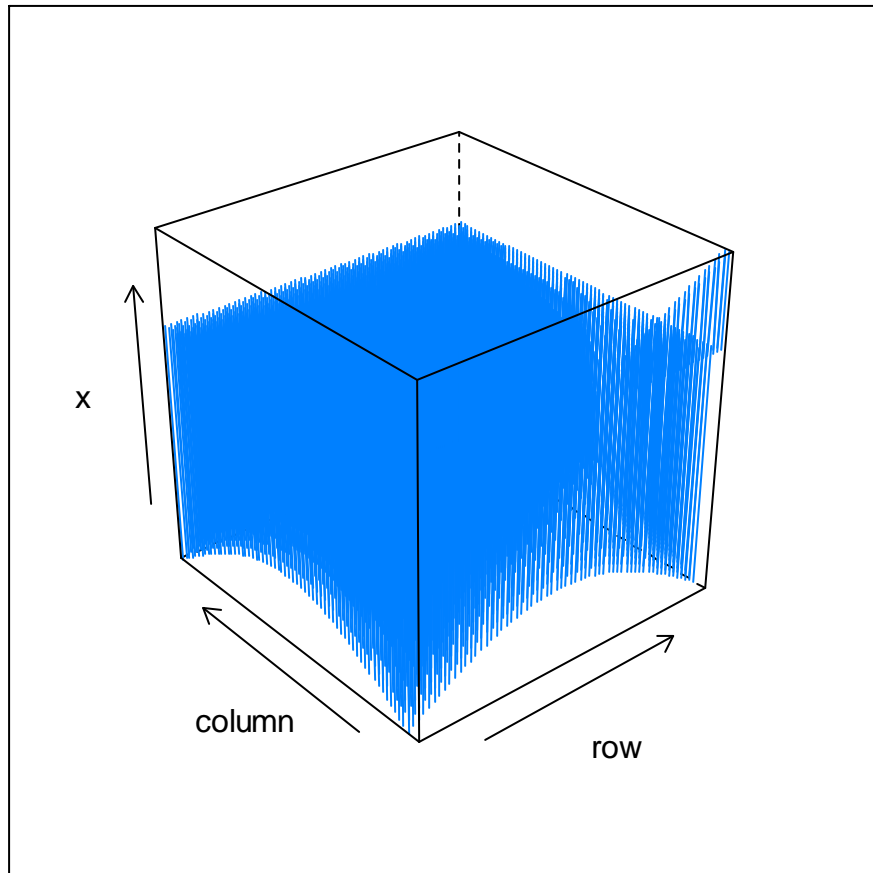
```
wireframe(x)
```





p. Draw a 3D scatterplot using lattice package.

`cloud(x)`



q. Draw a colorful 3D scatterplot using plot3d function of rgl package.

```
install.packages("rgl")
```

```
require(rgl)
```

```
plot3d(d1,d2,d3, col = 1:length(x))
```

