Surface Plots with MATLAB

We will plot the surface of equation

$$z = x^2 - y^2$$

as well as the level curves for $c = -2, -1, 0, 1, 2$.

In MATLAB, to get a rectangular domain $-2 \leq x \leq 2$, $-2 \leq y \leq 2$ in steps of 0.2, we use the command

```
>> [x, y] = meshgrid([-2:0.2:2],[-2:0.2:2]);
```

We calculate $z = x^2 - y^2$ as follows (note the use of .'s).

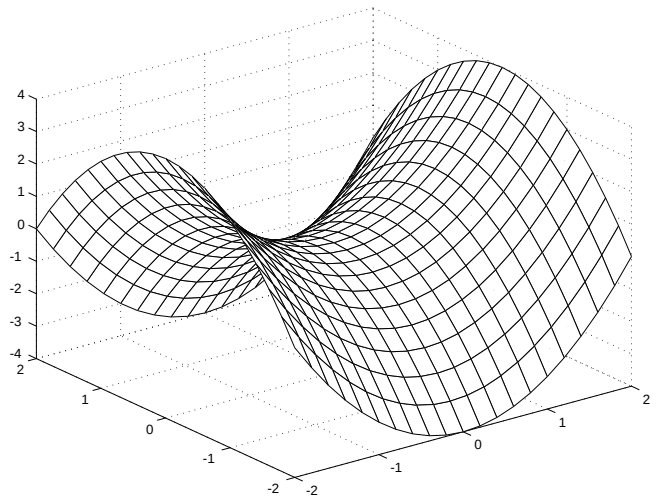
```
>> z = x.^2 - y.^2;
```

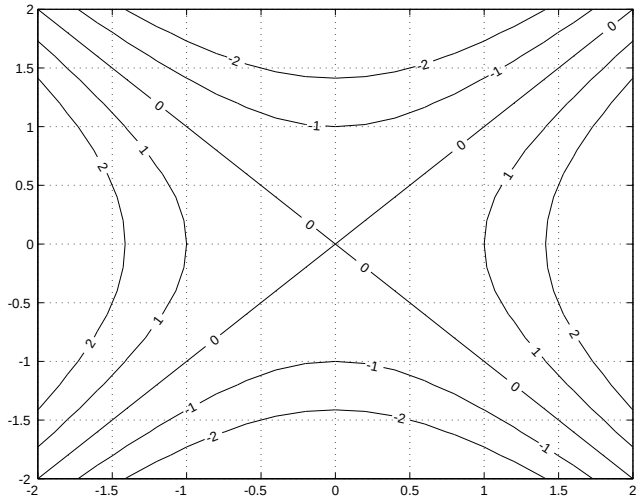
To obtain the surface plot, we use either of the following.

```
>> mesh(x,y,z)
>> surf(x,y,z)  %this one has colors
```

To plot the level curves for $c = -2, -1, 0, 1, 2$, we use the following commands.

```
>> [c,h]=contour(x,y,z,[-2,-1,0,1,2]);
>> clabel(c,h) %this labels the c values on the contour plot
```





The plot of the surface of equation

$$z = \frac{20}{3 + x^2 + 2y^2}$$

as well as the level curves for $c = 1, 2, 3, 4, 5$ are shown below.