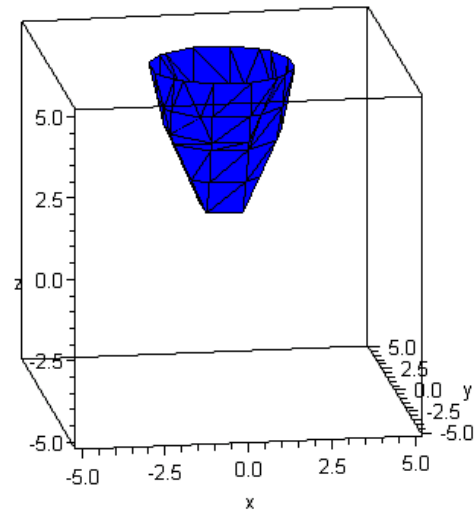


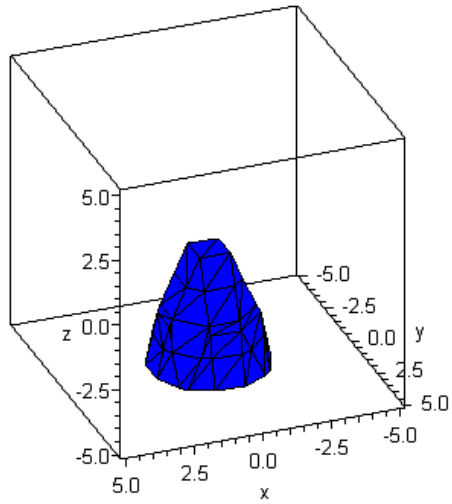
## Step-1

The graph of  $z = x^2 + y^2$  is a bowl opening upward as given below.



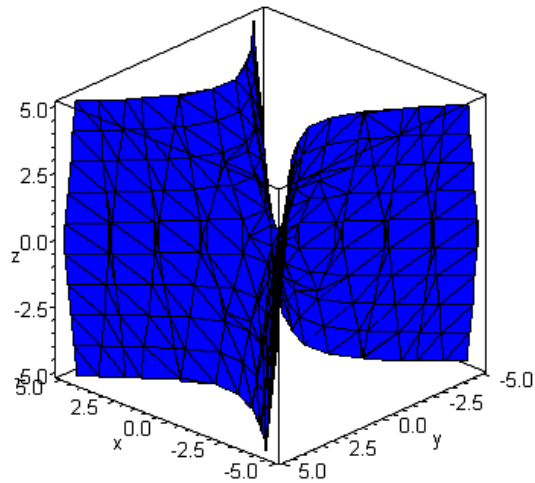
## Step-2

The graph of  $z = -x^2 - y^2$  is a bowl opening down ward as given below:



### Step-3

The graph of  $z = x^2 - y^2$  is a saddle as given below:



### Step-4

$ax^2 + 2bxy + cy^2$  has a saddle point at  $(0,0)$  if  $ac < b^2$  and the matrix is indefinite, that is, the Eigen values of the matrix are both positive and negative.