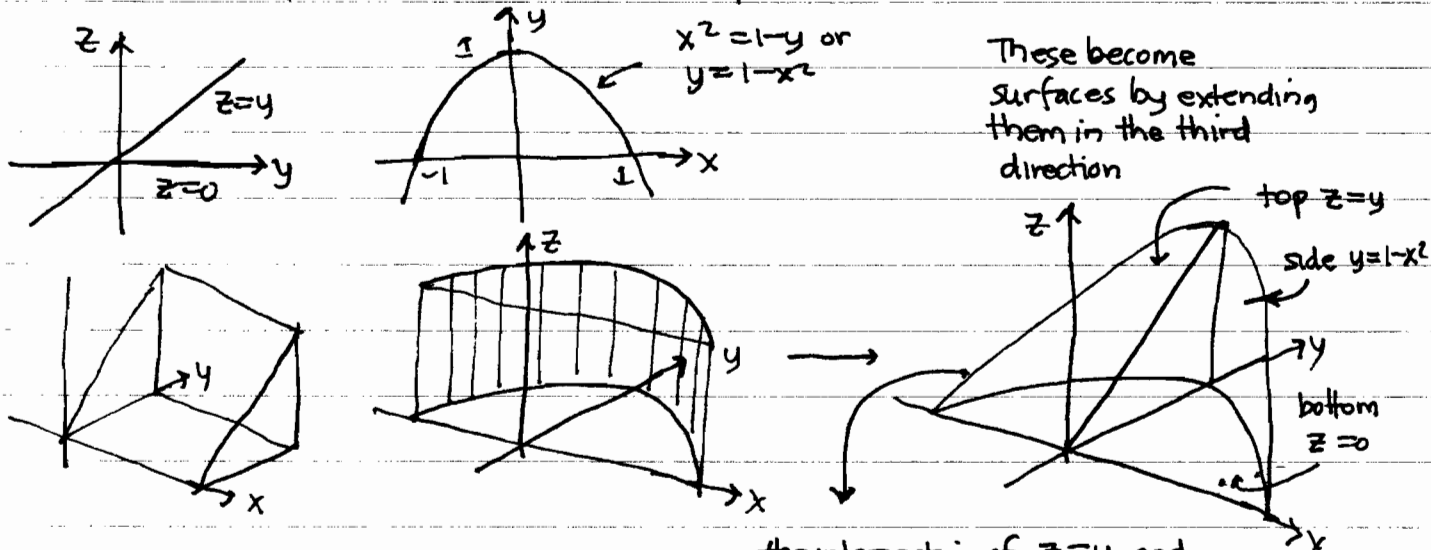


## Exercise in setting up triple integrals in Cartesian coordinates

Setup a triple integral over the region enclosed by the surfaces  $z=0$ ,  $z=y$ ,  $x^2=1-y$  for any function  $f(x,y,z)$  in all 6 possible iterations (15.7.29)

### How to visualize the region

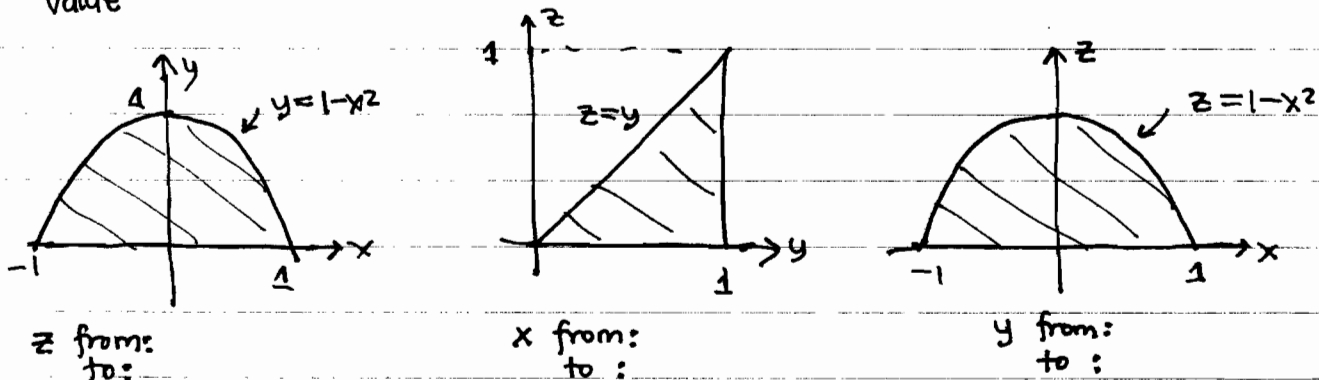
The first 2 surfaces are curves in the  $y$ - $z$  plane, the last a curve in the  $xy$  plane:



These become surfaces by extending them in the third direction

the intersection of  $z=y$  and  $y=1-x^2$  can also be described by  $z=y$  and  $z=1-x^2$ , giving the projection of the solid onto the  $xz$  plane.

We now see the projections of this solid onto the 3 coordinate planes, each of which corresponds to the region of the outer double integral which can be iterated in two ways, while the inner integral is in the third coordinate which has to be given a starting and stopping value



$z$  from: to:

$x$  from: to:

$y$  from: to:

In each case put in the 2 cross-sections (labeled endpoints) for the double integrals, identify the starting and stopping equations for  $z$ , then write down the 2 triple integrals. You can check by setting  $f(x,y,z)=1$  and integrating (MAPLE is quicker).