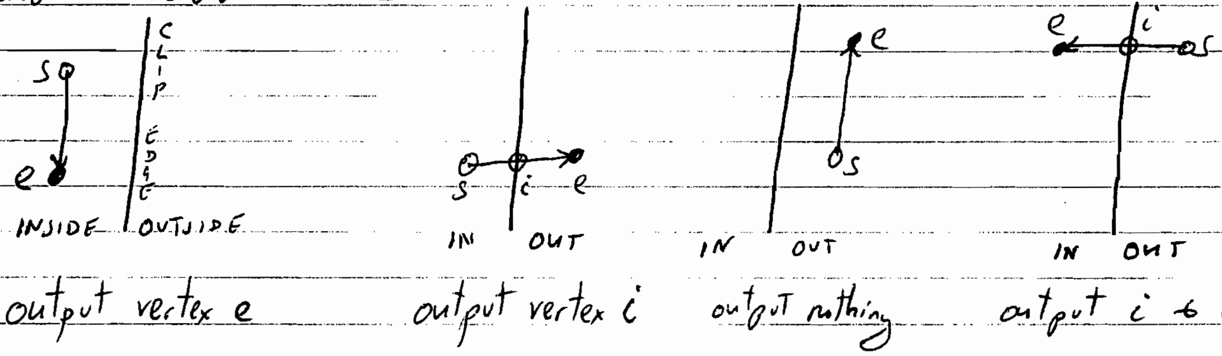
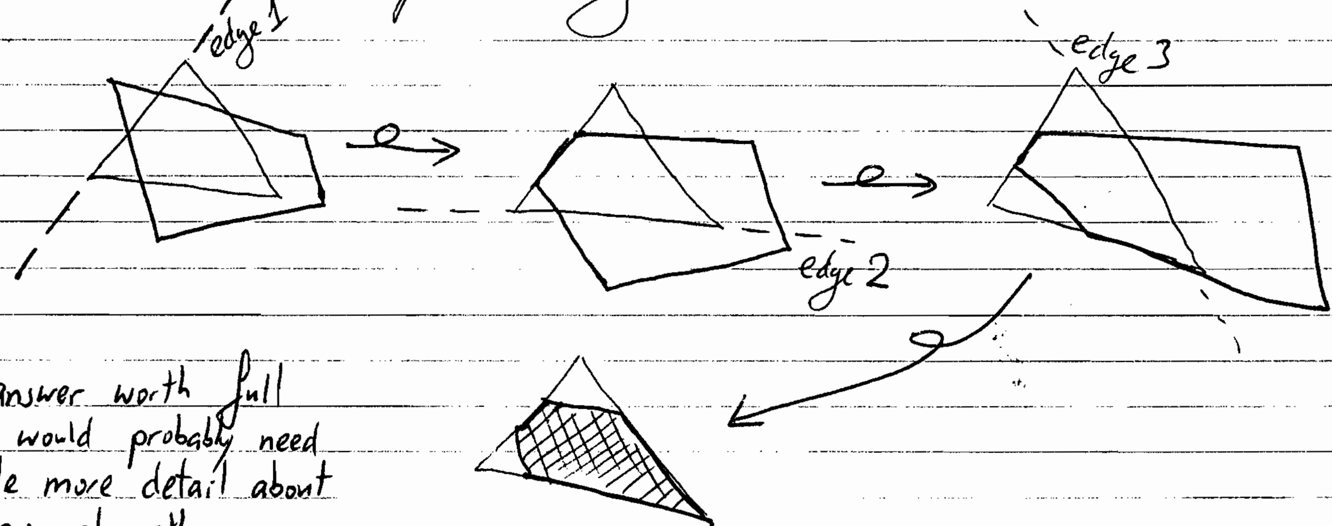
(b) There is a simple algorithm to perform this operation (the Sutherland-Hodgman algorithm). This is described below. Any other (working!) algorithm would be acceptable

The basic algorithm clips an arbitrary polygon against an arbitrary infinite edge.
The polygon is clipped against one edge at a time, passing the result onto the next stage until all edges have been clipped against.

The basic algorithm walks around the polygon, one edge at a time, outputting vertices as appropriate. This is shown below



The re-entrant use of this algorithm is illustrated below:

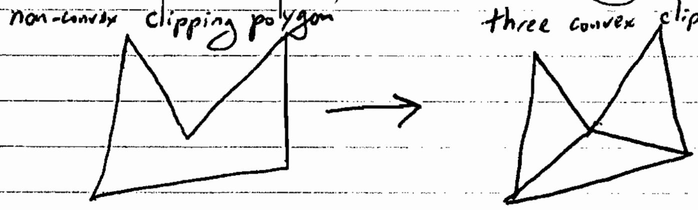


An answer worth full marks would probably need a little more detail about the basic algorithm.

(c) the above algorithm does not not work for a non-convex clipping polygon ~~algorithm~~ because it depends on the polygon being the union of a set of half planes. This is only true for convex polygons.

One way in which it could be extended to cope with non-convex clipping polygons would be for the non-convex polygon to be split into convex polygons (this is always possible); for the arbitrary polygon-to-be-clipped to be clipped against each of the convex polygons; and then for all of the clipped pieces to be joined together.

e.g.



(a) A scaling, a translation & a rotation are required. The rotation is easiest to calculate when split into two separate rotations.

ROTATION CALCULATIONS

The cone is initially oriented along vector $(0, 0, -1)$
We want to rotate it so it points along $(2, 7, -5) - (-1, 3, 7)$
$= (3, 4, -12)$

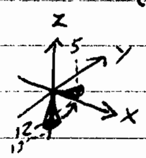
rotate this onto the yz-plane (about the x-axis)
by angle $\tan^{-1}(3/4)$ to give $(0, 5, -12)$
rotate this onto the -ve z-axis (about the x-axis)
by angle $\tan^{-1}(5/12)$ to give $(0, 0, -13)$

The four transformations, in order, are therefore:

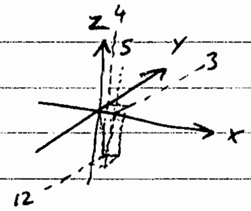
Scale by $(8, 8, 13)$

N.B. "diameter 1 unit"
"radius is 4 units"
$\Rightarrow$ scale $\times 8$

Rotate about x-axis by $\tan^{-1}(5/12)$ clockwise (assume right-handed co-ordinate system)



Rotate about z-axis by $\tan^{-1}(3/4)$ clockwise



Translate by $(-1, 3, 7)$