a)

b)

Using perspective projection camera model:

u is equivalent to image plane x coordinate, and v is equivalent to image plane y coordinate

c)

Rewrite each equation to equal ‘t’ and equate to each other

(1)

(2)

Cross multiply, bring right side to lift side, and move terms around to get implicit form of a line equation:

(3)

(4)

d)

When the line is directly parallel to the z axis or axis which spans out of the camera, the fixing of x and y axis allows for the line to continually extend in the z direction which give the illusion of a single point being projected onto the image plane