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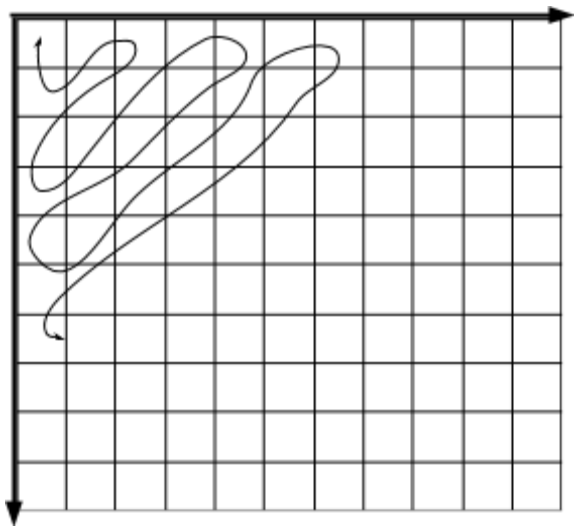
CS 112

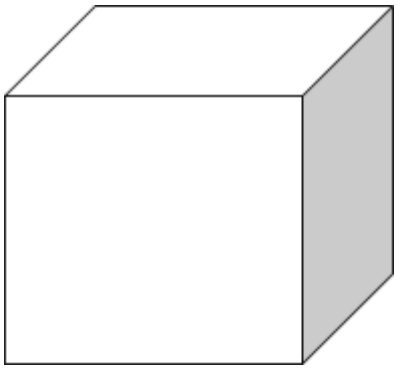
Written Assignment 1

1. Input 3D objects ⇒ Model-View Transformation ⇒ Projection Transformation ⇒ Clipping and Vertex Interpolation ⇒ Window Coordinate Transformation ⇒ Rasterization and Pixel Interpolation ⇒ Output 2D image
2. 

   Keeping a scheme like this will allow you to keep track of your data points because each level you go down simply adds 1, so as long as there is an origin you would be able to find a precise position in the image with an equation like: *row* = *x*+*y*-*1* in order to find the correct level and then *position* = *row* - *y* to get you to the right pixel.
3. Dimensions of a...
   a. point is 0
   b. line is 1
   c. triangle is 2
4. Implicit

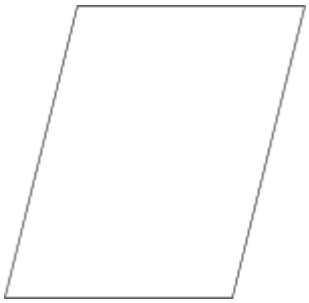
5. An object is defined as a manifold if every edge has exactly two incident triangles in 2D or exactly two incident tetrahedrons in 3D. A manifold with boundaries is defined if every edge has either one or two incident triangles in 2D or has either one or two incident tetrahedrons in 3D.

   Example of a manifold:



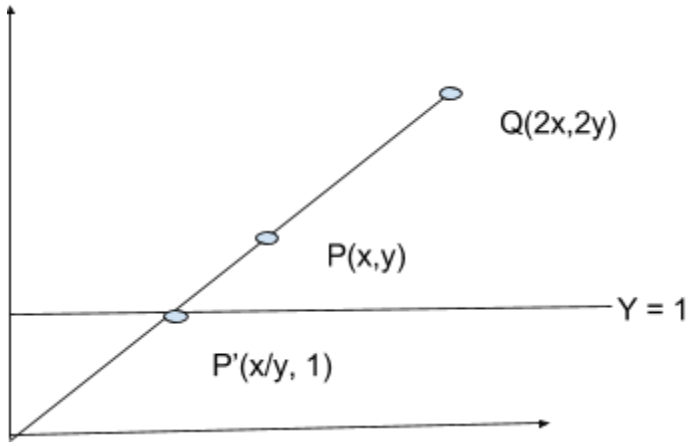
(a cube)

   Example of a manifold with boundary:



(a piece of paper)

6. The Euler characteristic of a cube is 2 and the genus of a sphere is 0
7.
   a. V = ½ E
   b. E = 2F
   c. 0
   d. No
8.
   a. 16 x 3
   b. 12 x 3
9. This can happen because all points that lie on the same vector will share homogeneous coordinates.



In the figure both P and Q would both map to P', as would any other point that existed on the line