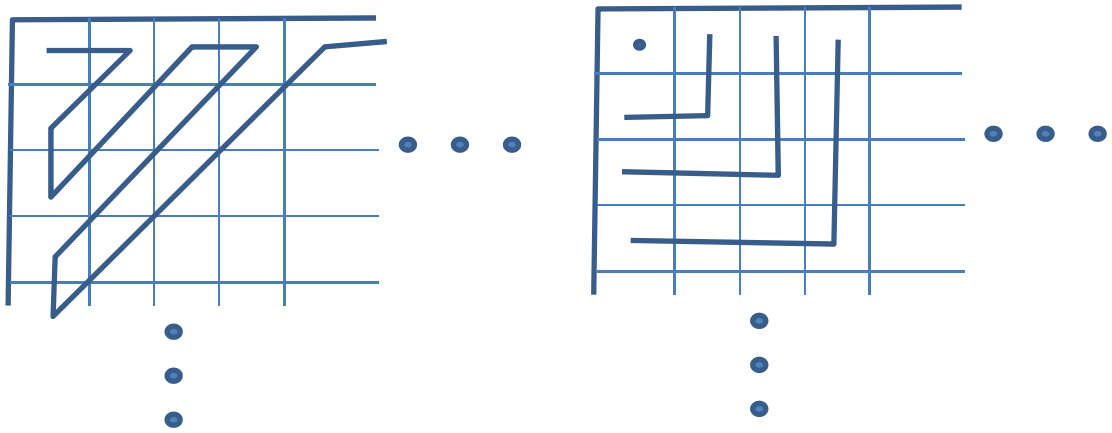
1) Input 3D object goes through the following transformations.
    a. ModelView Transformation
    b. Projection Transformation
    c. Window Coordinate Transformation
    d. Clipping and Vertex Interpolation
    e. Rasterization and Pixel Interpolation.

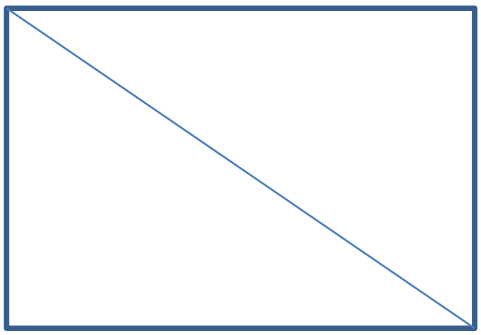
    This creates the output image.

2) We need to visit pixels in a order that will assure two things.
    a. All the pixels will be visited
    b. The indices should not contain any references to the width and height (this is the limitation of the scan line based traversal)

    Any zigzag traversal as shown below would assure this.



3) Point – 0, Line – 1, Triangle – 2
4) Implicit
5) Manifold is when a mesh has exactly two incident triangles at each edge. Example, is a 12 triangle cube – 2 triangles per face. Manifold with a boundary is a mesh that has either one or two triangles incident on each of its edge. Example, a single face paper sheet shown below made of two triangles. The edges with one incident triangles are the boundaries.



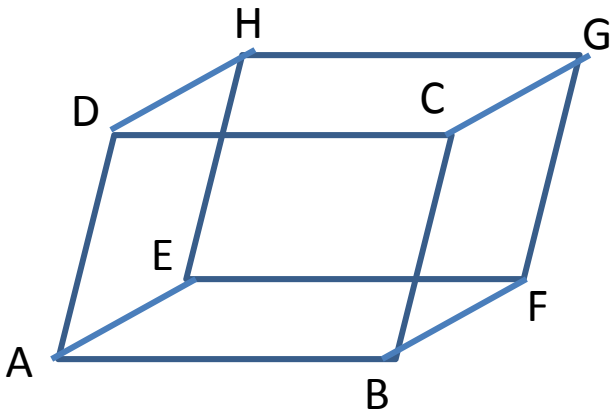
6) If you consider a cube with triangular faces, F = 12, E = 18, V= 8. Therefore **e = 2.** If you consider a cube with quadrilateral faces, F = 6, V=8, E= 12. There also, **e = 2.** Since e = 2-2g and e=2. Genus of a sphere is 0.
7) Let us assume that such a sphere is possible. Let the number of vertices be V.

Each vertex has degree 4. There 4 edges go out of each vertex. Therefore, if all vertices were disjoint. We would have E=4V. But since this is a connected mesh, every edge is counted twice from two vertices. Therefore, E= 2V. Therefore, V = E/2.

Second, every face is a quadrilateral. Therefore, if these faces were disjoint, we would have E = 4F. But each edge is counted twice from the two incident faces of the manifold. Therefore, E = 2F.

From this we see that the e= V-E+F = E/2 –E + E/2 = 0. But a sphere being topologically similar to cube should have e=2. Therefore such a construction is not possible.

8) Using rigid body transformation, you will need to only transform A, B, D and E which would take 4x16=64 multiplications and 4x12=48 additions. We will need to compute the lengths of AB, AE and AD which would be each 3x4=12 subtractions. To find the rest of the 4 points, we have to add these lengths to the appropriate one of A, B, D and E. Each of these will take 4 additions. Therefore, total of 16 additions. Therefore, we will need total of 64 multiplication and 76 additions. You may get slightly different answers based on the procedure you follow. As long as the concept is right, you have got it.



9) This will be done by using w=0 in the homogeneous coordinate. This represents only a direction which is equivalent to point at infinity.