# CS633 3D Computer Animation
## Homework Assignment 4 (40 points)
### Due: 3/15/2018

1. Given two *star-shaped* polyhedra, how would you modify their vertex-edge-face structures (boundary representations) so that they would have the same topology (so that we can perform interpolation on corresponding vertices to generate intermediate shapes in the process of changing one object into the other)? Use the following cube and the enclosed pyramid to explain your concept. Remember, at the end, the modified boundary representations should have the same vertex-edge-face structure. (10 points)
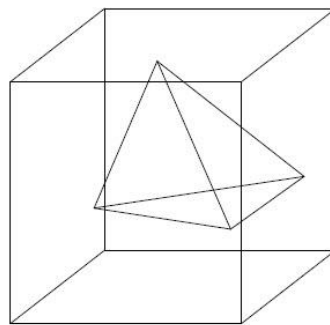


2. Question: can any genus-0 polyhedron be mapped to a sphere? If your answer is YES, prove it (must be precise). Otherwise, use an example to explain why this is not possible. (10 points)

3. To generate an intermediate image in the *coordinate grid* based *morphing* process, one has to generate an *intermediate grid* first. The source image and the destination image are then both warped according to the intermediate grid in a two-pass process. The warped images are then cross-dissolved to form the intermediate image. Question: can the two-pass warping process be merged into a one-pass process? Why or why not?    (10 points)

4. If *multiple* feature lines are used in the *feature* based *morphing* process, a relative weight has to be computed for each feature line. The source image locations computed for all the feature lines are then averaged to get a final source image location for the corresponding pixel in the intermediate image. Does this approach reduce to the technique shown on slide 40 of the notes: Interpolation based Animation II, when there is only one feature line given? (10 points)