Name: _____

CSCI 441 – Assignment 3

Due Friday 2/2/18
25 points total
Turn this in as a paper copy. Show all your work, not just an answer.

1. Write down 4*4 matrices for each of the following:

    1. To translate by the vector (1,2,3)

    2. To scale with respect to the origin by the amount (2,4,6)

    3. To rotate around the z-axis by 45 degrees (note sin 45 = cos 45 = 1/sqrt(2))

    4. To rotate around the x-axis by 45 degrees.

2. Find the 4*4 transformation matrices in order to accomplish:

1. Scaling an object with respect to the origin by 2 in x, y and z followed by a translation by (1,1,1).

2. Translation of an object by (1,1,1) followed by a scaling with respect to the origin by 2 in x, y and z.

Why are the two matrices different?

3. Find a matrix that will do a scale by (a,b,c) with respect to the point (x,y,z).

4. The *transpose* of a matrix with elements a[i,j] is the matrix with elements a[j,i]. (I.e., the rows become columns and the columns become rows). An *orthogonal* matrix is one which when multiplied by its transpose results in the *identity matrix*. Hence, the transpose is also the *inverse* of such a matrix. Amongst the various matrices (translation, scaling, rotation about X, Y and Z axes) - which are orthogonal?