# CMPUT 307: Quiz 2, Due Feb 11, 2022 on eClass

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1. [25] Write down the three homogeneous transformations for **scaling** (X by 1.5, Y by 1, and Z by 0.5), followed by **rotating** by 30 degree around Y-axis, followed by **translation** by (20, 10, -20) (cos 30 = 0.86 & sin 30 = 0.5). What is the single matrix representing the combination of these three transforms?

Ans.

3D homogeneous scaling matrix

3D homogeneous rotation matrix

3D homogeneous translation matrix

3D composite transformation matrix

1. (a) [5] What is the angle between the Vectors () and (1, 1, 1)?

Ans.

(b) [5] What is the direction normal (perpendicular) to the two vectors in (a)?

Ans.

Normal direction =

The direction normal to the 2 given vectors is (

(c) [15] What is the homogeneous matrix to rotate a Vector in the direction () to a Vector in the direction (1, 1, 1)?

Ans.

From Pythagoras theorem hyp2 = opp2 + adj2, we can find sin(θ), which is

Using the formula matrix:

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With x = 1, y = , z = 1

Gives the following homogenous matrix: