

Mathematics 308 — Homework 5 — due Monday, November 25

1. Reproduce the pictures you see in

<http://www.math.ubc.ca/~cass/graphics/text/www/pdf/ch9.pdf>

except that the cube should be a regular tetrahedron. Show at least three sides of the tetrahedron in each image.

2. The product of two rotations in 3D is again a rotation. Find the matrices of (a) rotation around $[0, 1, 0]$ by 90° ; (b) rotation around $[1, 1, 1]$ by 90° . Then find the axis and angle of the result of applying first (a) and then (b).

3. Assume the eye at $(0, 0, 5)$. Start with the cube of side 1 centred at the origin (sides aligned with axes). Translate its centre to $(0, -1, -1)$, and then rotate it around the axis through its centre and in the same direction as the positive z -axis by 45° . Plot and draw accurately by hand what you see if it is drawn in perspective.

4. Assume the eye at $(0, 0, a)$. It turns out that all the lines with a given direction, say (X, Y, Z) , intersect at one point when drawn in perspective. What is that point?