

NKU CSC 480  
Spring 2006  
Assignment 2

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*Display each of your steps neatly and carefully. The idea is not just to get the final answer, but to carefully lead the reader, step-by-step, to your solution. **Draw pictures!***

**1.** Find  $4 \times 4$  matrices representing the following transformations *and* their inverse transformations. Give your answers in factored rational-radical form as well as in numerical approximation. (That is, first as a product of matrices with entries like “ $(1+\sqrt{3})/2$ ,” then as a single matrix with entries like “1.367.”)

- a. A 30 degree rotation around the y axis.
- b. A 60 degree rotation around the axis running from the origin to  $(1,-1,0)$ .
- c. A reflection in the  $y=-3$  plane.
- d. A uniform scaling by a factor of 10 centered the point  $(2,-1,1)$ .

**2.** Consider the triangular face  $(A,B,C)$  with  $A=(0,0,0)$ ,  $B=(x,y,0)$ , and  $C=(0,0,z)$ . Find an expression for the midpoint and unit normal vector of this face.

**3.** Derive a  $4 \times 4$  matrix for a  $180^\circ$  rotation around the line from B to C in #2. Where does the origin get sent?

**4.** Give the  $4 \times 4$  matrix for a perspective projection onto a screen parallel the  $xy$  plane at  $z=-5$  with the eye at  $z=2$ . Where is the point  $(3,3,-10)$  mapped?

<p><b>Due:</b> At the start of class Thursday February 23. <b>This is an individual assignment; please work solo on this and seek me out if you have any questions.</b></p>
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