1 PROBLEM 1

Prove that two successive 2D rotations are additive:

$$R(\theta_1) \cdot R(\theta_2) = R(\theta_1 + \theta_2) \tag{1}$$

2 PROBLEM 2

Consider a line from the origin of a right-handed coordinate system to the point P(x, y, z). Find the transformation matrices needed to rotate the line into the positive z axis in two different ways, and show by algebraic manipulation that, in each case, the point P does go to the z axis. For each method, calculate the sines and cosines of the angles of rotation.

a. Rotate about the y axis into the (y, z)plane, then rotate about the x axis into the z axis.

b. Rotate about the z axis into the (x, z)plane, then rotate about the y axis into the z axis.

3 PROBLEM 3

Try to build a BSP tree for the graph below. For easier grading, please choose vertex at each step according to the alphabetical order. We provide an example below.

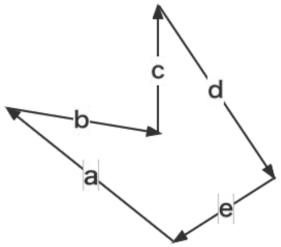

Fig. 1. problem

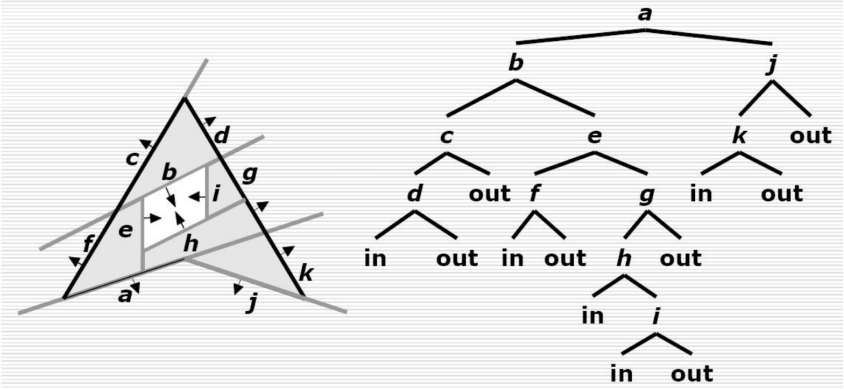

Fig. 2. example

4 SUBMISSION

Please upload your answer as a PDF file. Late submission will be scored less grade.