Graphics 2 – class exercise

A cube is displayed at three different viewing angles. The coordinates of its vertices at each of the three views are given in the vertex tables 1-3. The face table is (of course!) common to all three views. Given this information predict the visibility of faces F2 and F4 for each of the three views.

Vertex table 1

V1	0	0	0	1
V2	0	0.87	0.50	1
V3	-0.5	0.43	1.25	1
V4	-0.5	-0.43	0.75	1
V5	0.87	-0.25	0.43	1
V6	0.87	0.62	0.93	1
V7	0.37	0.18	1.68	1
V8	0.37	-0.68	1.18	1

Vertex table 2

V1	0	0	0	1
V2	0	0.87	-0.50	1
V3	0.5	1.30	0.25	1
V4	0.5	0.43	0.75	1
V5	0.87	-0.25	-0.43	1
V6	0.87	0.62	-0.93	1
V7	1.37	1.05	-0.18	1
V8	1.37	0.18	0.32	1

Vertex table 3

V1	0	0	0	1
V2	-0.87	-0.43	-0.25	1
V3	-0.87	-0.93	0.62	1
V4	0	-0.50	0.87	1
V5	-0.50	0.75	0.43	1
V6	-1.37	0.32	0.18	1
V7	-1.37	-0.18	1.05	1
V8	-0.50	0.25	1.30	1

Computing cross-product

E1=V2 – V1

E2=V3 – V2

N1=E1 × E2 =

Unit vectors

$$\begin{vmatrix} 1_x & 1_y & 1_z \\ x_2 - x_1 & y_2 - y_1 & z_2 - z_1 \\ x_3 - x_2 & y_3 - y_2 & z_3 - z_2 \end{vmatrix} =$$

$$1_x\,(y_2 - y_1)(z_3 - z_2) - (y_3 - y_2)(z_2 - z_1) +$$

$$1_y\,(x_3 - x_2)(z_2 - z_1) - (x_2 - x_1)(z_3 - z_2) +$$

$$1_z\,(x_2 - x_1)(y_3 - y_2) - (x_3 - x_2)(y_2 - y_1)$$

Face table

F1	1	2	6	5
F2	5	6	7	8
F3	3	4	8	7
F4	1	4	3	2
F5	1	5	8	4
F6	2	3	7	6