

COMPUTATIONAL GEOMETRY

Homework Set # 7 – An Example

(1). For each of the following sign vectors, draw an arrangement of 5 distinct lines, $\{\ell_1, \dots, \ell_5\}$, that has a face (either a 2-face (cell), a 1-face (edge), or a 0-face (vertex)) with the corresponding sign vector (where “+” means lying strictly above a line, “-” means strictly below, and “0” means on the line). Clearly label each line and highlight the face.

Give the dimension of each such face. Also, say for each case whether the arrangement is simple or not. (You should make your example simple if it is possible to do so.)

NOTE: Many different arrangements are possible to illustrate each case; chances are, your figure looks different from mine!

(a). $(0,0,+,+,+)$: This is a 0-face (vertex), since it lies on 2 or more lines. The arrangement is simple. See below, left.

(b). $(0,0,0,0,+)$: This is a 0-face (vertex), since it lies on 2 or more lines. The arrangement cannot be simple, since this 0-face is common to more than two lines and in a simple arrangement no three lines can pass through a common point. See below, right.

