CMT107 : Visual Computing - Exercise Sheet 2

Polygon Orientation

1) Given n three-dimensional points $p_1, \cdots p_n$ in this sequence, what is the standard convention in OpenGL to determine if a viewer looks at the front or the back side of the polygon?

2) Assume the unit vector $\mathbf{v}$ points towards the viewer from point p_1. Derive the formulas to determine whether the viewer is looking at the front or the back of the flat, convex, and simple polygon.

BSP-Trees

3) Construct a BSP-Tree for the following 2D line segments (see the figure): 1: (2, 2) → (6, 6); 2: (5, 3) → (8, 5); 3: (1, 1) → (1, 5); 4: (2, 5) → (3, 6); 5: (0, 2) → (2, 3); 6: (6, 2) → (8, 6). Note that these line segments are directed (from the start to the end position as listed above) such that one can distinguish what is on the left and the right of the line similar to polygon orientations in 3D.