1. * Describe a linear time algorithm to construct an st-orientation for a given biconnected graph. (The one I know is based on Depth-First-Search.)

2. Use Kirchhoff’s Theorem to calculate the number of spanning trees in the complete bipartite graph $K_{2,n}$, i.e., the graph with two vertices in one partition, $n$ vertices in the other partition, and an edge between $u$ and $v$ if and only if they are in different partitions. (Recall that the determinant of a matrix is the product of its eigenvalues. You can also verify your calculation using a combinatorial argument if you wish.)

3. Draw the rectangle visibility representation of the largest complete graph that has such a representation.

4. Give an example of a planar graph that is triangulated except for its outer 4-cycle $(N,E,S,W)$ that has a separating 4-cycle and yet also has a representation as a square tiling of some rectangle. Such an example exists with 9 vertices.

Recall that a graph $G = (V, E)$ with $V = \{1, 2, \ldots, n\}$ has a representation as a square tiling of a rectangle $R$ in the plane if there exist (closed) squares $S_1, S_2, \ldots, S_n$ such that no two squares share an interior point, $R = \bigcup_{i=1}^{n} S_i$, and $S_i \cap S_j \neq \emptyset$ if and only if $(i, j) \in E$.

References

