

Course 2BA1: Hilary Term 2002.

Assignment III.

To be handed in by Friday 18th January, 2002.

Please include both name and student number on any work handed in.

1. Consider the graph (representing the vertices and edges of an octohe-dron) which consists of 6 vertices, which we shall label as a, b, c, d, e and f , and the following 12 edges: $ab, bc, cd, da, ae, be, ce, de, af, bf, cf$, and df .
 - (a) Write down an incidence and adjacency matrices for this graph, where the vertices and edges are ordered as they are listed in the above specification (so that a is the first vertex, b is the second, etc., ab is the first edge, bc is the second etc.).
 - (b) Is this graph connected? [Justify your answer.]
 - (c) Is this graph complete? [Justify your answer.]
 - (d) Does this graph have an Euler circuit? If not, explain why not? If so, specify such a circuit?
 - (e) Give an example of a Hamiltonian circuit in this graph.
 - (f) Give an example of a spanning tree for this graph.
2. Consider a complete bipartite graph of type $K_{p,q}$. Give necessary and sufficient conditions that the natural numbers p and q must satisfy in order for this graph to have an Euler circuit.