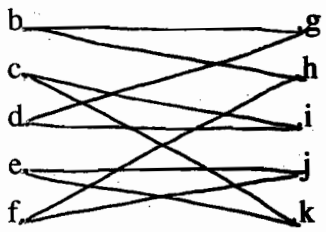
AMS 303 TEST 2A Spring 2008 Prof. Tucker

1. Give the cycle structure representation for a 135 degree rotation of the corners of an 8-gon.

2. a) Construct the matching network and make a flow corresponding to the partial matching c-i, d-g, e-j, f-h.
b) Apply the Augmenting Flow Algorithm (show ALL labels) and from it obtain a 5-edge matching.



3. Consider the game of Nim on the right. a)
a) What is the Grundy number of the initial positon
b) Make a move to get into a kernel position using pile 2.
c) Make a move to get into a position with Grundy number equal to 1
d) Suppose that 1 or 4 or 5 sticks can be removed at a time, determine is the Gurndy number of the initial condition and then make a move into the kernel.

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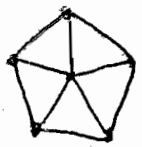
4. Give an expression for the pattern inventory of 2-colorings of the ***edges*** of the unoriented figure on the right (rotations and flips allowed).



5. I. In the following table of remaining games, it is possible for the Bears to be co-champions (or outright champions) if they win all remaining games? Build the appropriate network model. Answer the question with a feasible flow in the network you created or with an explanation of why one is not possible. If there are co-champions with the Bears, who are they?

Team	Wins to date	Games to play	with Bears	with Lions	with Tigers	with Vampires
Bears	20	6	—	1	2	3
Lions	25	6	1	—	3	2
Tigers	25	6	2	3	—	1
Vampires	23	6	3	2	1	—

II. Let G be a progressively finite graph with a kernel K and a Grundy function $g(\ )$. Form the graph G' by deleting the vertices in the kernel K. Let K_1 be the kernel of G'. Show that K_1 is precisely the set of vertices x with $g(x) = 1$ in the original graph G (that is, show that the vertices with $g(x) = 1$ in the original graph have the properties of a kernel in G').