

Due at the start of class Tu, Apr 20, 2004.

- Problem 1.** Let S_ρ be the set of web pages containing the string ρ . Suppose a search engine simply returned the pages in order of decreasing in-degree. Would this be a good measure? Give examples to illustrate why this strategy could produce undesirable results. How could someone design his own web page so that his web page got chosen with a high rank in such a search engine for most searches?
- Problem 2.** Suppose we wish to find a circular sequence of 16 bits, such that every sequence of 4 bits occurs exactly once. Use the Euler tour construction to check if such a sequence exists or not, and also find such a sequence (please show the graph explicitly).
- Problem 3.** Run the Breadth First Search algorithm on a graph of 8 vertices to show how the algorithm works. You can make up the graph. Please make sure that the graph is not totally trivial. The graph should be connected and have cycles.
- Problem 4.** When Mark climbs a staircase, he ascends either 1, 2, or 3 stairsteps with each step of the foot, but in no particular pattern from one foot to the next. How many ways can Mark climb a staircase of 10 steps? (Note that he must finish on the top step.) Suppose that a spill has occurred on the 6th step and Mark wants to avoid it. How many ways can he climb the staircase without stepping on the 6th step?
- Problem 5.** Use the method described in class to obtain an optimal alignment for the strings *ACATT* and *AATT*. Show the entire table, not just the final solution.