

EXAM 3 — DISCRETE MATHEMATICS

Name: _____

Student ID: _____

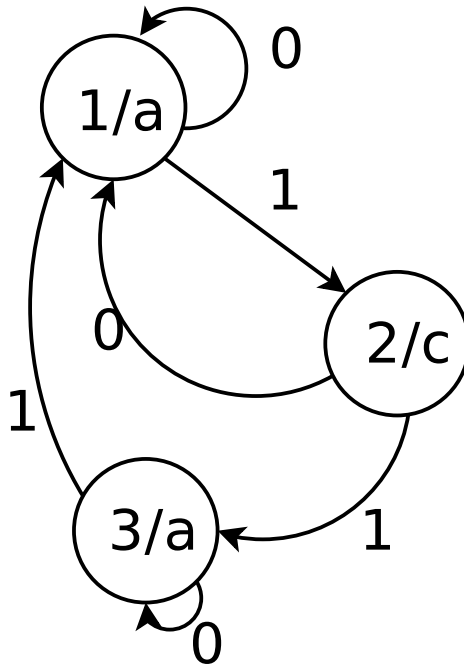
Email: _____

Show all work!

- (1) Find regular expressions for:
 - (a) Words with two vowels (10 pts)

(b) Words of even length (10 pts)

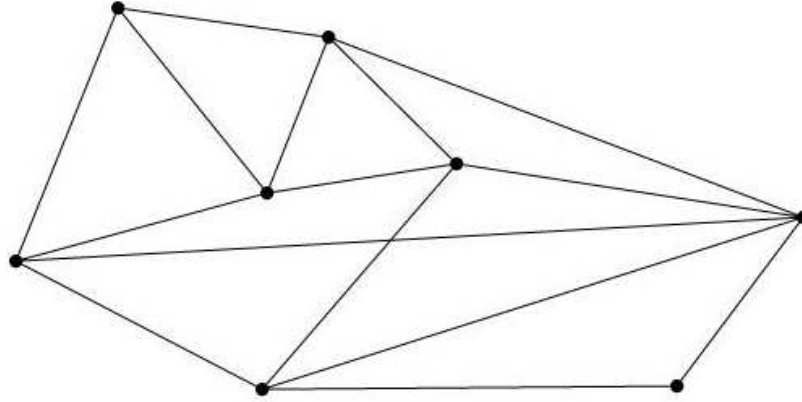
- (2) In the following finite state machine, the states are numbered and the machine outputs the character below slash under the state name when it enters that state (so, *after* the machine is started, an 'a' is output every time we *return* to the start state — starting there doesn't count). The start state is 1.



- (a) What is the output, if the input is the string '01101000'? (5 pts)

(3) What is the output if the input string is '111111'? (5 pts)

(4) Consider the graph:

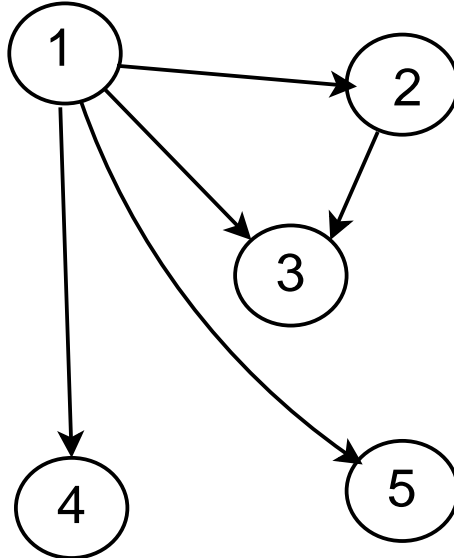


(a) How many odd nodes are there? (5 pts)

(b) Does this graph have an Euler path? If so, draw it. (15 pts)

- (5) Construct a finite state machine that would recognize binary strings where the number of 0's is even. (10 pts)

(6) Given the graph:



(a) Find its adjacency matrix, A . (10 pts)

- (b) Compute A^2 using the “exotic” matrix multiplication used in Warshall’s Algorithm — i.e.

$$(AB)_{ij} = \bigvee_{k=1}^n A_{ik} \wedge B_{kj}$$

(15 pts)

(c) Compute the reachability matrix of this graph. (15 pts)