CSE 468, Fall 2000

Midterm Exam

23 Oct 2000

- **Please write your name and SSN at the top of the sheet.**
- The exam consists of 3 exercises, totalling 100 points. Please write your answers directly on these pages.

Exercise 1 (40 pts)

Consider the regular expression $E = (a(a+b)b)^*$ on the alphabet $\Sigma = \{a, b\}$.

1. (20 pts) Give the minimal (deterministic) Finite Automaton recognizing this language.

2. (20 pts) Prove that the above FA is indeed minimal.

Exercise 2 (40 pts)

For each of the following two languages, say whether it is regular or not. Prove your answer.

1. (20 pts) $L_1 = \{x \in \{a,b\}^* \mid \exists k \geq 0 : |x| = 2k+1\}$

2. (20 pts) $L_2 = \{a^m b^n \mid m \leq n\}$

Exercise 3 (20 pts)

Given an alphabet Σ containing the symbol a, is it decidable whether a given FA M accepts exacly the strings containing only a's, i.e. whether $L(M) = a^*$? Prove your answer.