Computer Science 81, Spring 2010
Assignment 11
Due Tue. April 20
Please group problems as follows: (1 2) (3) (4) (5) (6)

All proofs are informal and intended to develop intuition and expository style, so please provide convincing write-ups of each.

1. [10 points] Sipser book, Problem 3.15 c only:

3.15 Show that the collection of decidable languages is closed under the operation of

[A]a. union.
b. concatenation.
c. star.
d. complementation.
e. intersection.

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2. [10 points] Sipser book, Problem 3.16 b only:

3.16 Show that the collection of Turing-recognizable languages is closed under the operation of

[A]a. union.
b. concatenation.
c. star.
d. intersection.

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3. [20 points] Sipser book, Problem 3.18:

***3.18** Show that a language is decidable iff some enumerator enumerates the language in lexicographic order.

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4. [20 points] Sipser book, Exercise 4.2:

4.2 Consider the problem of determining whether a DFA and a regular expression are equivalent. Express this problem as a language and show that it is decidable.

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5. [20 points] Sipser book, Exercise 4.4:

4.4 Let $A\varepsilon_{\mathsf{CFG}} = \{\langle G\rangle \mid G \text{ is a CFG that generates } \varepsilon\}$. Show that $A\varepsilon_{\mathsf{CFG}}$ is decidable.

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6. [20 points] Sipser book, Problem 4.10:

4.10 Let $INFINITE_{\mathsf{PDA}} = \{\langle M\rangle \mid M \text{ is a PDA and } L(M) \text{ is an infinite language}\}$. Show that $INFINITE_{\mathsf{PDA}}$ is decidable.