CS 2802: Homework 10

April 21, 2019

Handed out April 22, due April 29

- Read Chapter 12 in MCS

- Do the following problems (the first three are from the Rosen handout, the rest from MCS):

  - 13.4, 3(a),(c),(d) ("yes" or "no" suffices here)
  - 13.4, 7(a),(b),(d) (Just write down the regular expression.)
  - 13.4, 23
  - 13.4, 24
  - 12.4(a),(b),(d)
  - 12.8
  - 12.10
  - 12.11
  - 12.12 (For part (b), you can use any results proved in the text.)
  - 12.17(a)
  - 12.22
  - 12.50(a)

Additional problem 1: In the class notes, given a DFA $M_A = (S_A, I, f_A, s_A, F_A)$, I described an automaton $M_{A^*} = (S_A \cup \{s_0\}, I, f_{A^*}, s_0, F_A \cup \{s_0\})$, where

  - s_0 is a new state, not in S_A;

  - $f_{A^*}(s, i) = \begin{cases} f_A(s, i) & \text{if } s \in S_A - F_A; \\ f_A(s, i) \cup f_A(s_A, i) & \text{if } s \in F_A; \\ f_A(s_A, i) & \text{if } s = s_0. \end{cases}$

  Prove carefully that M_{A^*} accepts A^*. (Hint: induction helps for both directions of the proof.)

Additional problem 2: A zoo wants to set up natural habitats in which to exhibit its animals. Unfortunately, some animals will eat some of the others when given the opportunity. How can a graph model and a coloring be used to determine the number of different habitats needed and the placement of the animals in these habitats?

Think about (but don't hand in) 12.20, 12.30