Homework Assignment #1A

Note

This assignment is due 2PM Tuesday, October 6, 2009. Please write or type your answers on A4 (or similar size) paper. Drop your homework by the due time in Yih-Kuen Tsay's mail box on the first floor of Management Building II. Late submission will be penalized by 20% for each working day overdue. You may discuss the problems with others, but copying answers is strictly forbidden.

Problems

1. Solve the following exercise problems in Stallings' book (4th edition): 2.12 (10 points), 2.19 (10 points), 3.1(b) (5 points), 3.3 (10 points), 4.14 (10 points), 4.16 (10 points), 4.17 (10 points), 4.19(a)(b) (10 points), 4.26 (10 points), 4.27 (5 points).

2. A permutation operation on n (≥ 1) distinct objects (arranged in some order so that each object is uniquely identifiable by a number in $\{1, 2, \cdots, n\}$) can be represented by a table listing a permutation of the numbers from $\{1, 2, \cdots, n\}$ in the following sense: if the i-th entry of the table is p_i, then the new i-th object will be the original p_i-th object. For example, the following P is a permutation operation on 8 objects:

$$P = \begin{array}{c} \begin{array}{cccccccc} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \end{array} \\ \left[\begin{array}{cccccccc} 2 & 8 & 7 & 3 & 4 & 6 & 5 & 1 \end{array} \right] \end{array}$$

Given the input $M = \langle M_1, M_2, M_3, M_4, M_5, M_6, M_7, M_8 \rangle$, P produces the output $P(M) = \langle M_2, M_8, M_7, M_3, M_4, M_6, M_5, M_1 \rangle$.

   (a) Give the inverse permutation of the above P using the same representation. (5 points)

   (b) Let $[r_1 r_2 \cdots r_{n-1} r_n]$ be the inverse of a given permutation $[p_1 p_2 \cdots p_{n-1} p_n]$. Describe in precise terms the relation between r_i's and p_i's. (5 points)