Homework 2

Due Date: February 1, 2011   **Points:** 100

Questions

1. (*25 points*) Consider the construction in Section 3.5.2 that shows how to simulate three-parent joint creation using two-parent joint creation (this is on pp. 80–83 of the text). In the original paper, $cr_C(s,c) = c/R_3$ (that is, the t right was omitted) and $link_2(\mathbf{S}, \mathbf{A}_3) = \mathbf{A}_3/t \in dom(\mathbf{S})$ (the second part was omitted). Why won't this work? (*text*, problem 3.9, modified)

2. (*20 points*) A noted computer security expert has said that without integrity, no system can provide confidentiality.
   (a) Do you agree? Justify your answer.
   (b) Can a system provide integrity without confidentiality? Again, justify your answer.
   (*text*, problem 4.4)

3. (*20 points*) Expand the proof of Theorem 4–2 to show the statement, and the proof, of the induction. (*text*, problem 4.11)

4. (*10 points*) Given the security levels TOP SECRET, SECRET, CONFIDENTIAL, and UNCLASSIFIED (ordered from highest to lowest), and the categories A, B, and C, specify what type of access (read, write, or both) is allowed in each of the following situations. Assume that discretionary access controls allow anyone access unless otherwise specified.
   (a) Paul, cleared for (TOP SECRET, { A, C }), wants to access a document classified (SECRET, { B, C }).
   (b) Anna, cleared for (CONFIDENTIAL, { C }), wants to access a document classified (CONFIDENTIAL, { B }).
   (c) Jesse, cleared for (SECRET, { C }), wants to access a document classified (CONFIDENTIAL, { C }).
   (d) Sammi, cleared for (TOP SECRET, { A, C }), wants to access a document classified (CONFIDENTIAL, { A }).
   (e) Robin, who has no clearances (and so works at the UNCLASSIFIED level), wants to access a document classified (CONFIDENTIAL, { B }).
   (*text*, problem 5.2)

5. (*25 points*) Prove that the two properties of the hierarchy function (see Section 5.2.3) allow only trees and single nodes as organizations of objects. (*text*, problem 5.6)

Extra Credit

1. (*30 points*) The simulation of three-parent creation by two-parent creation using the Ammann, Lipton, and Sandhu scheme mimics the simulation using SPM. Present a simpler, more direct simulation usin the Ammann, Lipton, and Sandhu scheme that requires only five operations. (*text*, problem 3.10)