

CSCI/CSIS 631
Fall 2019
Homework 2
Solution

Let A 's compartment be (L_A, C_A) and B 's be (L_B, C_B) . The simple security condition says that A can read B if and only if $L_A \geq L_B$ and $C_B \subseteq C_A$. The *-property says that A can write B if and only if $L_B \geq L_A$ and $C_A \subseteq C_B$. Remember that TOPSECRET \geq SECRET \geq CONFIDENTIAL \geq UNCLASSIFIED.

- a) $L_{\text{Paul}} = \text{TOPSECRET} \geq \text{SECRET} = L_{\text{doc}}$, so Paul **cannot write** the document. Paul **cannot read** the document either, because $C_{\text{doc}} = \{B, C\} \not\subseteq \{A, C\} = C_{\text{Paul}}$.
- b) $L_{\text{Anna}} = \text{CONFIDENTIAL} \geq \text{CONFIDENTIAL} = L_{\text{doc}}$, but $C_{\text{doc}} = \{B\} \not\subseteq \{C\} = C_{\text{Anna}}$ so Anna **cannot read** the document, and $C_{\text{Anna}} = \{C\} \not\subseteq \{B\} = C_{\text{doc}}$, so Anna **cannot write** the document.
- c) $L_{\text{Jesse}} = \text{SECRET} \geq \text{CONFIDENTIAL} = L_{\text{doc}}$, and $C_{\text{doc}} = \{C\} \subseteq \{C\} = C_{\text{Jesse}}$, so Jesse **can read** the document. As $L_{\text{Jesse}} > L_{\text{doc}}$, however, Jesse **cannot write** the document.
- d) As $L_{\text{Sammi}} = \text{TOPSECRET} \geq \text{CONFIDENTIAL} = L_{\text{doc}}$ and $C_{\text{doc}} = \{A\} \subseteq \{A, C\} = C_{\text{Sammi}}$, Sammi **can read** the document. But the first inequality means Sammi **cannot write** the document.
- e) As $C_{\text{Robin}} = \emptyset \subseteq \{B\} = C_{\text{doc}}$ and $L_{\text{doc}} = \text{CONFIDENTIAL} \geq \text{UNCLASSIFIED} = L_{\text{Robin}}$, Robin **can write** the document. However, because $L_{\text{doc}} \geq L_{\text{Robin}}$, she **cannot read** the document.