

Unit A2: Structure Components, 9/5/03

Exercise 1: Objects in a Room

Let us revisit Exercise A1-1. Again, consider the following conditions about objects in a room (logic):

1. An object must have another object on top of it.
2. An object cannot be on top of itself.
3. If an object X is on top of another object Y, Y cannot be on top of X.

Then, we re-examine the structures (scenarios) that would satisfy the conditions.

- A. **Scenario:** The room does not have a ceiling. There is an object (call it Object #1) on the floor. There is another object (call it Object #2) on top of Object #1. There is yet another object (call it Object #3) on top of Object #2. More objects are stacked in this manner without limit.

Question: Identify sets, relations, and functions (where applicable) as components of the structure corresponding to the above scenario.

Hint: Refer to the examples North Pole and Traffic Lights regarding how to write your answer.

- B. **Scenario:** There are three objects.

Question: Identify sets, relations, and functions (where applicable) as components of the structure corresponding to the above scenario.

- C. **Scenario:** There are no objects.

Question: Identify sets, relations, and functions (where applicable) as components of the structure corresponding to the above scenario.

Exercise 2: Sets, Relations, and Functions

For each of the following concepts, choose the most appropriate way of representing it from set, relation, and function. Concisely explain why your choice is more appropriate than the other choices.

1. Buildings on the TCNJ campus
2. Products sold at each vending machine on the TCNJ campus (at a certain time)
3. Cash deposit of each vending machine on the TCNJ campus (at a certain time)
4. Islands that have a lake *without* the boundary [Note: This may sound strange. But the lake on those islands must not have the boundary.]
5. Elevation of islands that have a lake *without* the boundary
6. Animals that live on islands that have a lake *without* their boundary

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