

COMP 681 Formal Methods Spring 2006 Recitation 8—Solutions

1. You are given the predicate

$gives(x, y, z)$

meaning that x gives y to z . Define the following predicates in terms of this.

a. $receives(x, y, z)$ meaning x receives y from z

Answer

$gives(z, y, x)$

b. $gets(x, y)$ meaning x gets y

Answer

$gives(x, y, x)$

2. You are given the following predicates.

$parent(x, y)$ meaning x is a parent of y

$male(x)$ meaning x is male

$female(x)$ meaning x is female

Define the following predicates in terms of these.

a. $mother(x, y)$ meaning x is a (the) mother of y

Answer

$parent(x, y) \wedge female(x)$

b. $son(x, y)$ meaning x is a son of y

Answer

$parent(y, x) \wedge male(x)$

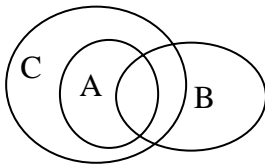
3. Use Venn diagrams to evaluate the validity of the following syllogisms.

a. Some A 's are not B 's.

All A 's are C 's.

Some C 's are not B 's.

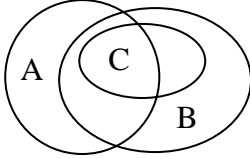
Answer: Valid



There's no way to draw this so that the premises are true and there's not a part of C that's not a part of B —the part of A not in B is a Part of C not in B .

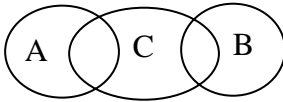
- b. Some *A*'s are not *B*'s.
Some *A*'s are *C*'s.
Some *C*'s are not *B*'s.

Answer: Invalid



- c. No *B*'s are *A*'s.
Some *A*'s are *C*'s.
Some *C*'s are not *B*'s.

Answer: Valid



There's no way to draw this so that the premises are true and there's not a part of *C* that is not also a part of *B*—that part of *C* that's part of *A* is a part of *C* that is not a part of *B*.