Translate sentences to logical expressions

Example 1: If \((x + y \geq 300)\) then \((x \geq 150 \text{ or } y \geq 150)\)

We define the following predicates:

Translation:

For the next two examples, the universe of discourse (domain) is all students at UW-Madison. We define the following predicates:

- \(S240(x)\) : \(x\) is a student in CS 240
- \(Calc(x)\) : \(x\) has studied calculus
- \(CS(x)\) : \(x\) is a CS major

Example 2: Every student in this class has studied calculus.

Rewrite: For every student in this class, they have studied calculus.

Translation:

Why not:

Example 3: Some students in this class are not CS majors.

Rewrite: There is a student in this class who is not a CS major.

Translation:

Why not:
Multiple quantifiers and domains

Example: The Bacon number of an actor is the number of degrees of separation they have from Kevin Bacon. Kevin Bacon has a Bacon number of 0. Actors who have co-starred with Kevin Bacon have a Bacon number of 1. Actors who have co-starred with actors who have co-starred with Kevin Bacon have a Bacon number of 2, and so on.

Use propositional logic to define what it means to have a Bacon number of 2. Use the following domains and predicates:

- Actors = domain of all actors
- Movies = domain of all movies
- Bacon2(x) : x has a Bacon number of 2
- Costars(a, b, m) : a and b both appeared (co-starred) in movie m

Kevin Bacon → Michael Rooker → Joan Jett → Silas Howard


Bacon number of 2 means

Bacon2(x) =

Translate to predicate logic: Every integer has an additive inverse.

Consider

Take-away