CISP 440

Austin Smothers

Homework 11

## Section 1.3

1. Not a propositional function
2. Not a propositional function
3. Propositional function.

Domain: Real numbers

1. “**1** divides 77” is a true statement.
2. “For some n, n divides 77” is true.

Example: “**11** divides 77”

1. “For all students x, there exists some student y such that x is not taller than y”

This statement is false because of the three student domain, Marty and Garth are both taller than Erin, therefore there are no other students who are not taller than Erin.

1. Vx Vy, L(x,y)
2. True
3. For all x, there exists some y such that x < y
4. True, because there exists no x such that, if x > 1, then x2 < x
5. True, because the statement 0 < 0 + 1 is true.
6. True, because there exists no combination of x and y such that x2 + y2 < 0
7. True, because if VxVy P(x,y) is true, there exists no value x such that VxVy would be false, which implies that all values of x evaluate to true, meaning 3xVy must also be true.
8. True, for the same reasoning provided in 56.
9. Logically equivalent, because 3xVy is the negation of Vx3y, and !(P(x,y)) = !(P(x,y))

## Section 1.4

1. P 🡪 Q

P is true

Therefore Q is true

This argument is valid

1. P 🡪 R

R is true

Therefore P is true

This argument is not valid

1. P 🡪Q v R

!Q ^ !R

Therefore !P

This argument is valid

1. If 4 megabytes is better than no memory at all, then we will buy more memory or a new computer

If we buy a new computer, then we will not buy more memory

Therefore, if 4 megabytes is better than no memory at all, then we will buy a new computer

This is a valid argument

1. If 4 megabytes is better than no memory at all, then we will buy a new computer

If we buy a new computer, then we will buy more memory

Therefore we will buy more memory

This is not a valid argument

1. This argument is not valid
2. This argument is valid
3. This argument is not valid
4. This argument is valid
5. (P v Q) 🡪 R

P

S

Therefore R ^ S

1. Vx P(x)

3x Q(x)

Therefore 3x Q(P(x))