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ECE 369 Homework 1

Proposition and Predicate Logic

Exercise 1.1

Problems:

3. (a) true

3. (b) false

3. (e) true

3. (f) false

8. (a)

8. (c)

8. (f)

13. (a)

13. (c)

13. (d)

Exercise 1.2

Problems

42. 1. hyp

2. hyp

3. hyp

4. hyp

5. C hyp

6. 1, 3, mp

7. S 4, 6,mp

47. 1. hyp

2. hyp

3. hyp

4. 1, 3, hs

5. 4, 2, mt

6. 5, De Morgan’s Law

7. 6, sim

Exercise 1.3

Problems

2. (e) true, if y = 0;

2. (f) true,

2. (h) false, if x = 0;

11. (a)

(b))

(c)

16. (a)

16. (i)

16. (l)

Exercise 1.4

F: Flowers

P: Flowers are purple

R: Flowers are red

PA: Pansies

4. 1. hyp

2. hyp

3. hyp

4. 3, ui

5. 1, ei

6. 2, ei

7. 4, 5, hs

8. 4, 6, hs

9. 7, eg

10. 8, eg

Some pansies are Purple.

Some pansies are red.

PI: Flowers are pink

TH: Flowers have thorns

B: Bad smell.

W: Weed

5. 1. hyp

2. hyp

3. hyp

4. 1, ei

5. 4, sim

6. 2, ui

7. 3, ui

8. 5, 6, mp

9. 7, 8, mp

10. 9, eg

Some flowers smell bad.

9. (a) Let Q (x, y): x talks to y

:

Everybody is talked by someone, but someone can be different person.

:

Someone talks to everyone. Someone should be the same person.

So cannot imply .

(b) The step4 to step5 is wrong.

4. 3, ug

5. 4,eg

The above is the right deduction.

33. 1. hyp

2. hyp

3. hyp

4. 1, ei

5. 4, ui

6. 2, ui

7. 5, 6, hs

8. 6, 7, eg

9. 8, ug

37. 1. hyp

2. hyp

3. hyp

4. 1, ui

5. 4, ei

6. 2, ui

7. 6, ei

8. D(x) 3, ui

9. 7, 8, mp

10. 9, imp

11.

Problem I:

Are A \or (B \and C) and (A \or B) \and C equivalent?

= =

Problem II:

Let us define the following predicates in the domain of all people.

P(x): x is a professor

I(x): x is ignorant

V(x): x is vain

Express the following English sentences using predicate logic:

(i) No professor is ignorant.

(ii) All ignorant people are vain.

(iii) No professor is vain.

(You can tell a professor set this question.)

Does (iii) follow from (i) and (ii)? If so, prove, otherwise, give a counter-example.