# CSE112 Introduction to Artificial Intelligence, Week 13 2019

**Exercises**

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**Question 1**. Given (1) PQ, (2) PR, and (3) Q R, Prove R

1. PQ

2.PR

3. Q R

4.R [negated conclusion]

4. QR [1,2]

5. R [3,4]

6.{} [4,5]

**Question 2.** Prove P  (Q  R), Q  S, P  Q |= RS

1. P  (Q  R)

2.Q S

3.P Q

4. RS [negated conclusion]

5. P S [2,3]

6. (S Q)  S R) [1,5]

7. S R [6]

8. S Q [6]

9.S [2,8]

10. RS [9]

15.{} [4,9]

**Question 3**. Show that the hypotheses

1. “It is not sunny and it is colder than yesterday.”
2. “We will go swimming only if it is sunny”.
3. “If we don't go swimming then we will play tennis.”
4. “If we play tennis then we will be home by sunset.” imply the conclusion “We will be home by sunset.”

1.sunny(w)

2. go\_swimming(x) sunny(w)

3. go\_swimming(x) play\_tennis(x)

4. play\_tennis(x) be\_home\_by\_sunset(x)

5.go\_swimming(x) [1,2]

6. play\_tennis(x) [3,5]

7. be\_home\_by\_sunset(x) [4,6]

**Question 4.** Show that the premises ∀ ∃

1. “A student in this class has not read the book.”
2. “Everyone in this class passed the exam.”

imply “Someone who passed the exam has not read the book.”

∃x student(x) read(x)

∀x student(x) pass(x)

To prove: ∃x student(x) read(x)pass(x)

**Question 5**. “Some patients like any doctor, no patient likes any quack, so there is no quack.” Prove it.

∃p ∀d like (p, d)

∃p∀q like(p, q)

To prove:∃q

# Question 6

People who love all animals are loved by someone No one loves anyone who killed animals.

Jack loves all of the animals,

Jack or Bob killed the cat named Tuna, Prove: Bob killed the cat.

# Question 7

It is known that “Customs officers inspect every insignificant person. Some drug traffickers enter the country and are only inspected by drug traffickers. No drug trafficker is an important person”. Prove: There are drug traffickers among the customs officers.