

Template of CSE 579 Project Milestone 2 -- Solutions to Basic Clingo Problems

This template only records your clingo programs, command lines, and outputs of the 3 ASP programs given below. The Multi-Choice Single-Correct questions need to be answered directly in the graded assignment “Course Project: Milestone 2 -- Solutions to Basic Clingo Problems” in Coursera.

Problem 1

Consider the ASP program below from Unit 3 Module 2.[U3-M2 lecture slide].

```
p
r <- ¬p ^ q
```

Find all the stable models of this program using clingo and fill in the following table. When writing down the command line, assume the clingo program is saved in file “p1.txt”.
(Note: Your command line may be different depending on your OS. You may truncate your output if it’s too long but make sure you don’t remove a part if it can support your answers to the Multi-Choice Single-Correct questions in the end)

Input Program	p. r:-p,q
Command Line	clingo ./program.txt 0
Output (truncated)	<pre>clingo version 5.4.0 Reading from ./program.txt ./program.txt:2:6-7: info: atom does not occur in any rule head: q Solving... Answer: 1 p SATISFIABLE Models : 1 Calls : 1 Time : 0.000s (Solving: 0.00s 1st Model: 0.00s Unsat: 0.00s) CPU Time : 0.000s</pre>

1- Which answer option is a correct statement about the following ASP program (in **Problem 1**)?

```
p
r <- ¬p, q
```

- ☐ This ASP program has exactly 1 stable model.
- ☐ This ASP program is a non-definite program.
- ☐ This ASP program is NOT a positive program.
- ☐ This ASP program is unsatisfiable under propositional logic.

The answer is **A. This ASP program has exactly 1 stable model.**

Problem 2

Consider the ASP program below from Unit 3 Module 6. .[U3-M6 lecture slide].

```
p <- q
q <- ¬p
```

Find all the stable models of this program using clingo and fill in the following table. When writing down the command line, assume the clingo program is saved in file "p2.txt".
(Note: Your command line may be different depending on your OS. You may truncate your output if it's too long but make sure you don't remove a part if it can support your answers to the Multi-Choice Single-Correct questions in the end)

Input Program	p:-q. q:-not p.
Command Line	clingo ./program.txt 0
Output (truncated)	<pre>clingo version 5.4.0 Reading from ./program.txt Solving... UNSATISFIABLE Models : 0 Calls : 1 Time : 0.005s (Solving: 0.00s 1st Model: 0.00s Unsat: 0.00s) CPU Time : 0.001s</pre>

Which answer option is a correct statement about the following ASP program (in **Problem 2**)?

- ```
p <- q
q <- ¬p
```
- ☐ This ASP program is an unsatisfiable program.

- ☐ This ASP program has one stable model.
- ☐ This ASP program is a positive program.
- ☐ This ASP program has no stable model but is satisfiable under propositional logic.

The answer is **A**. This ASP program is an unsatisfiable problem.

### Problem 3

Consider the ASP program below consisting of rules from Unit 3 Module 7. .[ U3-M7 lecture slide].

```
p <- p
p v q
```

Find all the stable models of this program using clingo and fill in the following table. When writing down the command line, assume the clingo program is saved in file “p3.txt”.  
(Note: Your command line may be different depending on your OS. You may truncate your output if it’s too long but make sure you don’t remove a part if it can support your answers to the Multi-Choice Single-Correct questions in the end)

Hint: rule “p v q” can be seen as “p v q <- T”.

|                    |                                                                                                                                                                                                                                     |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Program      | p:-p.<br>p,q:-#true.                                                                                                                                                                                                                |
| Command Line       | clingo ./program.txt 0                                                                                                                                                                                                              |
| Output (truncated) | <pre>clingo version 5.4.0 Reading from ./program.txt Solving... Answer: 1 p Answer: 2 q SATISFIABLE  Models      : 2 Calls       : 1 Time        : 0.001s (Solving: 0.00s 1st Model: 0.00s Unsat: 0.00s) CPU Time    : 0.001s</pre> |

3. Which answer option is a correct statement about the following ASP program (in **Problem 3**)?

```
p <- p
p V q
```

- ☐ The critical part of the propositional rule in the ASP program is the “p” in the body of the first rule.
- ☐ This ASP program has exactly 1 stable model and is satisfiable under propositional logic.
- ☐ This ASP program has exactly 2 stable models.
- ☐ This ASP program is a definite program.

The answer is **C**. This ASP program has exactly 2 stable models.