University of Lincoln
School of Computer Science
CMP2020M Artificial Intelligence
Classic AI Planning

Open the Planning Web Service at http://lcas.lincoln.ac.uk/fast-downward. For all the following tasks discuss your main findings and observations with your neighbours and the demonstrators. A planning problem is described by a "domain" specification (defining all the actions and their preconditions and effects) and a "problem" (describing objects, initial and goal states). These are given in the language PDDL, a language inspired by logic languages like LISP and Prolog.

Q1. Read the assignment brief carefully and make sure you ask the delivery team any questions you might have. Then, have a look at the problem definitions for the assignment, to be found on *http://lcas.lincoln.ac.uk/fast-downward* in the drop down menu "predefined problems", with names "assignment_problem_1_cleaning" and "assignment_problem_2_cleaning". Draw the respective initial and goal states to understand these two problems well.

Q2. Look at "depot" domain and the "depot-01" and "depot-02" problems. This domain comprises of trucks, which can transport crates around and then the crates must be stacked onto pallets at their destinations. The stacking is achieved using hoists, so the stacking problem is like a blocks-world problem with hands. Trucks can behave like "tables", since the pallets on which crates are stacked are limited.

a. Draw a figure that represents the initial state of depot-01.

b. Draw how a valid goal state would look like.

c. Looking at action "lift" (below), what do ?x, ?y, ?z, and ?p represent?

```
(:action lift
:parameters ( ?x ?y ?z ?p)
:precondition
(and (hoist ?x) (crate ?y) (surface ?z) (place ?p) (at ?x ?p)
(available ?x) (at ?y ?p) (on ?y ?z) (clear ?y))
:effect
(and (lifting ?x ?y) (clear ?z) (not (at ?y ?p)) (not (clear ?y)) (not (available ?x)) (not
(on ?y ?z))))
```

d. Change the problem definition, to only contain one truck. How does it affect the plan?

Q3. Continue to finish the last workshop questions if you have not finished them.