Salomón Olivera Abud – A01171503

Juan Carlos Estebes González – A01204421

- **Which heuristics did you use for the A* algorithm?**

  Our heuristic was based in the difference between the initial stack state and the goal state. For example, if we have 3 stacks and one of them is already in the goal state, the heuristic will be four.

- **Test your program with a couple of different problems. Increase the size of the problem to test the limits of your program. Make a table comparing** how many nodes are searched **to find the answer for each problem. For this table, you should compare a number of different problems (at least 3) to avoid a statistical bias. Which of the three algorithms (UCS, A with consistent and and A with an inconsistent heuristic) searches the least nodes and which one take the most?**

Test Case	UCS	A* consistent heuristic	A* inconsistent heuristic
1 **(A); (B); ()** **(A, B); (); ()**	13 nodes searched	13 nodes searched	13 nodes searched
2 **(A); (B); (C)** **(A, C); X; X**	7 nodes searched	5 nodes searched	5 nodes searched
2 **(A); (B); ()** **(A, B); X; X**	3 nodes searched	2 nodes searched	3 nodes searched
3 **(A); (B); (C); ()** **(); (A); (B); (C)**	82 nodes searched	27 nodes searched	53 nodes searched

- **Why does this happen?**

  Because A* uses a heuristic that tries to predict which one is the right way, even when the heuristic is bad we can appreciate that it's still better than UCS but it's all thanks to the heuristic.

- **Which algorithms are optimal? Why?**

  It depends on what the conditions are, if we define a heuristic then the UCS has no chance against A* making this last one more optimal but if there is no heuristic they will give all the possibilities before finding a solution.

- **In your opinion, what are the benefits of simpler algorithms versus more complex ones?**

  Complex algorithms give more optimal results than the simpler ones, but simple algorithms are better when the problem is really simple; they help us to try to understand complex algorithms too. For example, if we hadn't seen UCS before A* maybe we could have more problems trying to understand how it works.