**6.**   **Answer the following questions:**

*a.*   *Describe in words the relative pattern of number of expanded states for UCS and A\* with the two different heuristics.*

**Comparing the two sets, we find that UCS is usually always more costly than either A\* algorithm. We can also note that A\*2 seems to be less costly in all aspects of the runs, with only their first runs starting at length 2 being the same.**

*b.*   *Why do we find that pattern?*

**We can take the data generated from these runs and compare all of it to notice that A\*2 is the most efficient in all aspects measured.**

*c.*   *Describe in words the relative pattern of number of expanded states for Iterative Deepening and IDA\* with the two different heuristics.*

**Looking at the data generated, we notice that IDA\* algorithms always use less states than Iterative Deepening alone for these sets of problems. We can also note that IDA\*2 is always less costly (expanded states wise) than IDA\*1 or ID. I believe it is also important to note that while more states are expanded and generated for IDA\*1 over IDA\*2, all of the ID and ID\* runs use the same amount of memory for all runs upto length 12.**

*d.*   *Why do we find that pattern? And how does that pattern compare to what you saw in 6A and 6B?*

**We can take the data generated from these runs and notice that all of the data points towards IDA\*2 being the most efficient, except for the memory usage for all 3 algorithms use the same amount of memory. So while Iterative deepening uses less resources, it also takes longer in the long run to use Iterative deepening over A\*2, because A\*2 has the least amount of expanded and generated states.**

*e.*   *Describe the memory usage (max states in memory) that you observed for UCS, and the two variations of A\*.*

**The memory starts small but makes major spikes as it increases for UCS. A\*1 starts small and makes small increases until it get to the 8th iteration when it starts to make major spikes. A\*2 is different from the other two. It starts low and barely increases.**

*f.*    *Describe the relative memory usage (max states in memory) that you observed for Iterative Deepening and IDA\* with the two different heuristics.*

**ID and IDA\*1 and 2 used the same amount of memory throughout the run**

*g.*   *Explain the memory usage that you observed for the three iterative deepening algorithms (IDA\* and ID) versus the others (UCS and A\*).*

**ID and IDA\* used extremely less memory than UCS and A\*. The memory only increased by 2 every other run for ID. The memory increased significantly with each run for UCS**