G52AIM CW3 REPORT

QUESTION 1.

Unlike the previous algorithms, Simulated annealing will take a solution, it performs a random bitflip to discover a neighbour and then it checks the value of the new neighbour. The new solution will be accepted if the value is non-worsening or when using the Boltzman probability. This is different to ILS since it just accepts a new solution if it isn't worsening. Same difference is valid for DBHC and SDHC too since they also accept improving moves.

QUESTION 2.

Q2A.

If T0 is optimally set and alpha is extremely small the temperature will cool down in a quick manner. This due to the temperature formula which is T = T0 x alpha, which means a decrease in the value of alpha will reduce the temperature value and possibly make it negligible. Hence the algorithm will start accepting non-worsening moves and it will start to resemble a hill climbing algorithms. The Boltzman probability will stay at a low value after a few iterations.

Q2B.

If T0 is set optimally and alpha is very high the temperature will cool down extremely slowly. This will cause the algorithm to accept a lot of worsening moves. Since cooling is slow, the Boltzman probability will stay at a high value.

QUESTION 3.

Q3A.

The starting temperature and the value of alpha could be changed to tune the simulated annealing

Q3B.

Sequential tuning, design experiments and meta-optimisation

QUESTION 4.

ONE/TWO TAILED TEST USED

Two Tailed

X_a AND X_b

Leave this section blank if you chose to perform a two-tailed test.

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p-VALUE

The p value is 0

CONCLUSION

Since P is less than 0.05 the result is significant. Therefore, it is possible to reject the null hypothesis of the median difference between SA and ILS is 0. This is a proof that ILS performs better than SA in the MAX-SAT problem 5