COMP417 Artificial Intelligence
1st Exercise Set

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Exercise 4

Part A

Since only one state ($k = 1$) is stored in memory after each iteration, it is iteratively succeeded by its best neighboring state like in hill climbing. Hence, the local beam search algorithm with $k = 1$ is a simple hill climbing algorithm.

Part B

With temperature $T = 0$, we can say that the probability $e^{\Delta E/T} = 0$ when $\Delta E \leq 0$, namely only better neighboring solutions are accepted. Therefore, simulated annealing with $T = 0$ is a first choice hill climbing algorithm.

Part C

If $N = 1$, the population will consist of a single individual. Crossover will thus happen between (two copies of) that individual, resulting in the exact same solution. The random mutation mechanism will introduce a small number of point changes during each iteration, consequently turning genetic algorithm into a random walk.