1. Give the name that results from each of the following special cases:

a. Local beam search with k=1.

b. Local beam search with one initial state and no limit on the number of states retained.

c. Simulated annealing with T=0 at all times (and omitting the termination test).

d. Simulated annealing with T=infinity at all times.

e. Genetic algorithm with population size N=1.

2. Label the following as T (= True) or F (= False).

a. An admissible heuristic NEVER OVER-ESTIMATES the remaining cost (or distance) to the goal.

b. Best-first search when the queue is sorted by f(n) = g(n) + h (n) is both complete and optimal when the heuristic is admissible and the total cost estimate f(n) is monotonic increasing on any path to a goal node.

c. Most search effort is expended while examining the interior branch nodes of a search tree.

d. Uniform-cost search (sort queue by g(n)) is both complete and optimal when the path cost never decreases.

e. Greedy best-first search (sort queue by h(n)) is both complete and optimal when the heuristic is admissible and the path cost never decreases.

f. Beam search uses O(bd) space and O(bd) time.

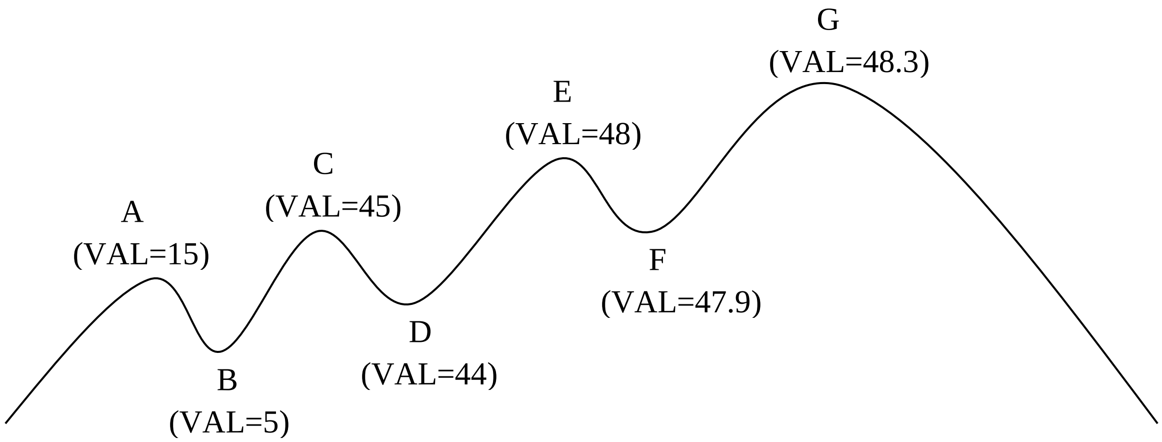
g. Simulated annealing uses O(constant) space and can escape from local optima.

h. Genetic algorithms use O(constant) space and can escape from local optima.

i. Gradient descent uses O(constant) space and can escape from local optima.

3. Perform Simulated Annealing search to maximize value in the following search space.

Recall that a good move (increases value) is always accepted (P = 1.0); a bad move (decreases value) is accepted with probability $P = e^{\Delta VAL/T}$, where $\Delta VAL = VAL(Next) - VAL(Current)$.



Use this temperature schedule:

Time Step	1–100	101–200	201–300
Temperature (T)	10	1.0	0.1

This table of values of *e* may be useful:

x	0.0	−1.0	−4.0	-4.3	−40.0	−43.0
e^x	1.0	≈0.37	≈0.018	≈0.014	$\approx 4.0*10^{-18}$	$\approx 2.1*10^{-19}$

a. (2 pts each, 56 pts total) Analyze the following possible moves in the search. The first one is done for you as an example.

Time	From	To	T	ΔVAL	ΔVAL/T	P
57	A	B	10	−10	-1	0.37
78	C	B				
132	C	B				
158	C	D				
194	E	D				
194	E	B				
238	E	D				
263	E	F				

289	G	F				
289	G	D				

b. At Time=100, is the search more likely to be in state A or in state C? (ignore E, G)

c. At Time=200, is the search more likely to be in state A, C, or E? (ignore G)

d. At Time=300, is the search more likely to be in state A, C, E, or G?