

## **Justification of Statements (AI Search Techniques)**

### **a. First choice hill climbing performs better for problems with high branching factor.**

True.

Explanation: First choice hill climbing evaluates successors randomly and picks the first better state it finds. In problems with a high branching factor (many possible successors), this approach avoids evaluating all successors, thus saving time and memory. It performs better compared to algorithms that evaluate all nodes exhaustively.

### **b. The mutation step of genetic algorithm increases diversification.**

True.

Explanation: The mutation step introduces random changes in individuals (solutions), adding variety to the population. This helps the algorithm explore new areas of the solution space and prevents premature convergence to local optima. Hence, mutation increases diversification.

### **c. In simulated annealing, the temperature $T$ is decreased rapidly for better performance.**

False.

Explanation: In simulated annealing, temperature  $T$  must be decreased slowly (gradual cooling). If  $T$  is reduced too quickly, the algorithm may get stuck in a local optimum and fail to explore the solution space properly. A slow decrease allows it to escape local optima and find a better global solution.