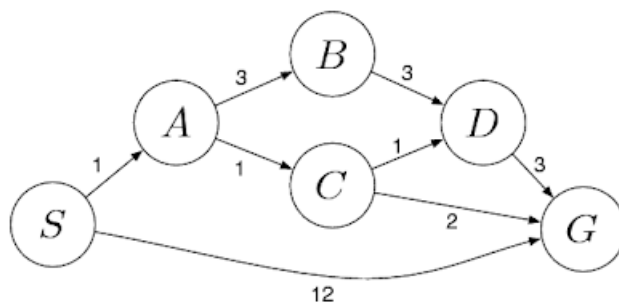**Test 1 - Sample 1 (25 points)**
Questions from Chapter 1, 2, and 3
"All questions carry equal points."

1. With example calculations, discuss the Manhattan distance (h2) heuristic for the 8-puzzle game.
2. Given node A, having child nodes B, C, D with associated costs of (10, 5, 7). After expanding C, we see nodes E, F, G with costs of (40, 50, 60). Which node will be chosen by the Uniform Cost Search and Greedy Best-first Search? Why?
3. Write the Depth-first search algorithm.
4. Discuss the space complexity of the Breadth-first search algorithm.
5. What is the difference between the tree search algorithm and graph search algorithm?
6. For the two-room vacuum world problem, answer the following:
    1. How many possible world states are there?
    2. Which will be the initial state?
    3. What actions are possible?
    4. Discuss the transition model.
    5. How is a state tested for a goal state?
    6. How is the path cost calculated?
7. Define (a) agent, and (b) rational agent.
8. How has "The Availability of Very Large Datasets" influenced the field of AI?
9. In the context of Neural Networks, the _____ algorithm was applied to many learning problems in computer science and psychology, and it caused great excitement.
10. Show the contents of the priority queue in the following graph as Uniform cost search is applied to reach from state S to state G.

Test 1 - Sample 2 (25 points)
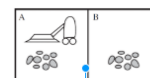Questions from Chapter 1, 2, and 3
"All questions carry equal points."

1. The performance of heuristic search algorithms depends on _____.
2. In Chapter 3, slide 43, what will be the contents of the priority queue after expanding Fagaras? (algorithm will not be given)
3. If g(n) is the cost to reach the node, and h(n) is the cost to get from the node to the goal, what is the difference between Uniform Cost search and A* search?
4. In Chapter 3, slide 40, apply Greedy best first search to show the path from Arad to Bucharest. (algorithm will not be given)
5. What is the time complexity of the BFS algorithm? A problem has a branching factor of 10, 2 nodes can be processed per second, and only one-byte memory is needed per node. At level 3 of the search graph using BFS, what is the number of nodes, space requirement, time requirement?
6. For the 8-puzzle game, what actions are possible in a given random state?
7. What is the difference between a state in a route-finding problem and a touring problem?
8. What is the difference between a leaf node and frontier?
9. What is the difference between agent function and agent program? Discuss with an example. For your example, how will the agent function look like, and how will agent program look like?
10. Complete the following agent program for the two-room vacuum world problem.

function REFLEX-VACUUM-AGENT([$location, status$]) **returns** an action

    if $status = Dirty$ **then** _____
    else if $location = A$ **then** _____
    else if $location = B$ **then** _____

Test 1 - Sample 3 (25 points)
Questions from Chapter 1, 2, and 3

1. (7.5 points) Update the given BFS Code to make it Uniform-cost search.
2. (2.5 points) Uniform-cost search expands the node n with lowest g(n). What is g(n)?
3. (2.5 points) What data structures do BFS, Uniform-cost search, and DFS use?
4. (2.5 points) Given the general 'GRAPH-SEARCH' algorithm (slide 22) which lines correspond to 'memorizing' the nodes that have already been visited?
5. (2.5 points) What do P, E, A, and S stand for in the task environment description?
6. (2.5 points) Draw a diagram showing the relationship between agent, sensors, actuators, environment, percepts, and actions.
7. (2.5 points) Define Turing test.
8. (2.5 points) What are the four approaches to AI? Complete the chart below.

These definitions are concerned with
thought process and **reasoning**

?	?
(ex. problem solving, learning)	(ex. computations that make it possible to perceive, reason, and act)
?	?
(ex. disease diagnosis)	(ex. intelligent agents)

Measure success in terms of
human performance

Measure success in terms of
ideal performance measure
(rationality).

These definitions address **human behavior**