2. (16 pts total, 4 pts each) Your book defines a task environment as a set of four things, with the acronym PEAS. Fill in the blanks with the names of the PEAS components.

P___________  E_________  A__________  S_________

3. (24 pts total, 4 pts each) Label the following statements as True (T) or False (F).

3.a. ___ Local search algorithms generally operate only on one (or a few) current node(s).
3.b. ___ Local search algorithms generally are used to find the globally optimal solution.
3.c. ___ In tabu search recently visited states are temporarily excluded from being visited again.
3.d. ___ Simulated annealing is more likely to accept a bad move late in the search than earlier.
3.e. ___ Local beam search retains the $k$ best successors of the $k$ states in the previous step.
3.f. ___ Hill-climbing moves to the best successor of the current state.

4. (10 pts total, 5 pts each, -1 for each wrong answer, but not negative) You are performing genetic algorithm search for the 8-queens problem. Perform cross-over on these pairs of chromosomes at the indicated points.

4.a.

3 2 7 5 2 4 1 1
2 4 7 4 8 5 5 2

4.b.

3 2 7 5 2 4 1 1
2 4 4 1 5 1 2 4

**** TURN PAGE OVER AND CONTINUE ON THE OTHER SIDE ****
5. (50 pts total, 10 pts each) Execute Tree Search through this graph (i.e., do not remember visited nodes, so repeated nodes are possible). It is not a tree, but pretend you don't know that.
Step costs are given next to each arc. Heuristic values are given next to each node (as $h=x$). The successors of each node are indicated by the arrows out of that node.
(Note: C is a successor of itself).
For each search strategy below, indicate the order in which nodes are expanded (i.e., to expand a node means that its children are generated), ending with the goal node that is found. The first one is done for you as an example.

5.a. DEPTH FIRST SEARCH.

$S$ $A$ $D$ $G1$

5.b. (10 pts, -3 for each wrong answer, but not negative) UNIFORM COST SEARCH.

$S$

5.c. (10 pts, -3 for each wrong answer, but not negative) GREEDY (BEST-FIRST) SEARCH.

$S$

5.d. (10 pts, -3 for each wrong answer, but not negative) ITERATED DEEPENING SEARCH.

$S$

5.e. (10 pts, -3 for each wrong answer, but not negative) A* SEARCH.

$S$

5.f. (10 pts, -3 for each wrong answer, but not negative) OPTIMALITY.
Did Uniform Cost Search find the optimal goal? ______ Why or why not?____________________
Did A* Search find the optimal goal? ______ Why or why not?____________________