Algorithmic Problem Solving Quick Test: Greedy Algorithms and Dynamic Programming

October 19th, 2018 - 40 minutes.
All documents forbidden.
One A4 handwritten sheet allowed.

Name:

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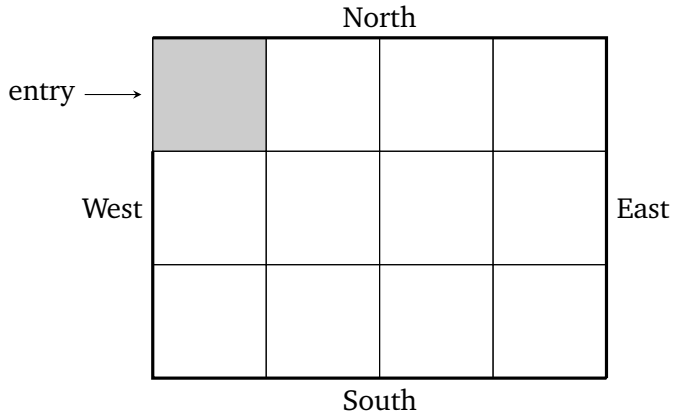
The Broken Tractor

October is corn harvest time. Uncle Bob has an M meters by N meters field where each square meter has produced a given amount of corn. An example of a 3x4 field is given in the figure below, where the production of each square is omitted for clarity. Uncle Bob enters the field in the north west corner of the field, depicted in gray. Unfortunately, Uncle Bob's high-tech tractor is broken : it's GPS/Compass system only permits it to advance towards **South** or **East**.

Your task is to help him **maximizing** his harvest in only one pass (he can only enter the field once).



Question 1 Analyze the problem with respect to the different algorithm techniques you know. Discuss in depth the advantages and the drawbacks for all of them. Use the above graphics to show the best example or counter-example you can imagine (you can draw more if you need more examples).

Question 2 Write the pseudocode of the algorithm you suggest for uncle Bob.

Question 3 If not yet already done, study and give the complexity of your solution.