2009 Paper 4 Question 4

Artificial Intelligence I

(*a*) Describe the following in the context of planning:

(*i*)   STRIPS operators;   [1 mark]

(*ii*) situation space *versus* plan space (point out the differences);   [2 marks]

(*iii*) partial order planning (briefly explain key features).   [2 marks]

(*b*) Consider the following partial order planning problem for creating a picture of an aquarium. The goal is to have painted_background and also drawn(Fish), drawn(Crab) and drawn(Seahorse). The start state is empty(Picture). You can use the following:

- paint_background with precondition empty(Picture) and with effects painted_background and ¬empty(Picture)

- draw(x) with no preconditions and with effects drawn(x) and ¬empty(Picture)

(*i*)   Write the *start* state and the *finish* state. Draw a partial order plan with preconditions above the operators and effects below the operators. Draw the causal links.   [8 marks]

(*ii*) Define what threats are. Comment on whether there are any in your partial order plan above, and how you would solve them. Add temporal links to your partial plan as dotted arcs.   [4 marks]

(*iii*) How many solution plans are there in your partial order plan? List all solution plans with total ordering of steps implied by your partial order plan.   [3 marks]