4. (a) Explain, using examples, how forward and backward chaining control reasoning in rule-based systems. [3]

(b) i. What is meant by conflict resolution in the context of rule-based systems? [2]

ii. Describe how and why refractoriness and specificity are useful techniques for conflict resolution. [3]

(c) Ian and Jen enter a weekly cross-country running race. Ian offers Jen a bet that whoever loses the race between them will buy the post-race drinks. They usually spend £30 on drinks, which they split equally (if there is no bet). Jen assesses her chances of winning, which depends on whether the course is muddy. If the course is muddy Jen estimates she has a 6/10 chance of winning and if it is not muddy she has a 3/10 chance. The probability of a muddy course is 7/10.

i. Show a decision tree for the problem. [4]

ii. Solve the decision tree to determine whether Jen should accept the bet. [6]

iii. Represent the problem using an influence diagram. [3]

iv. Extend the influence diagram to show how you would incorporate the availability of a pre-race course inspection. What additional information will be required to solve the new influence diagram? [4]