Question 1

The monkey-and-bananas problem is faced by a monkey in a laboratory with some bananas hanging out of reach from the ceiling. A box is available that will enable the monkey to reach the bananas if he climbs on it. Initially, the monkey the monkey is at $A$, the bananas at $B$, and the box at $C$. The monkey and box have height $Low$, but if the monkey climbs onto the box he will have height $High$, the same as the bananas. The actions available to the monkey include $Go$ from one place to another, $Push$ an object from one place to another, $ClimbUp$ onto or $ClimbDown$ from an object, and $Grasp$ or $Ungrasp$ an object. The result of a $Grasp$ is that the monkey holds the object if the monkey and object are in the same place at the same height.

a. Write down the initial state description.

b. Write the six action schemas.
c. Suppose the monkey wants to fool the scientist, who are off to tea, by grabbing the bananas, but leaving the box in its original place. Write this as a general goal (ie: not assuming that the box is necessarily at C) in the language of situation calculus. Can this goal be solved by a classical planning system?

d. Your schema for pushing is probably incorrect, because if the object is too heavy, its position will remain the same when the Push schema is applied. Fix your action schema to account for heavy objects.
Question 2

Prove that for any two player game tree, adding a constant $C$ to the values of the leaf nodes does not change the optimal action at the root.

Thanks to Artificial Intelligence: A Modern Approach by Russel and Norvig for the first question.