Game Theory Tutorial 1

1. Two players have to decide how to divide a cake C. First player 1 cuts the cake into two pieces, P_1 and P_2 and then player 2 decides which piece to take.

   (a) Suppose that the cake is homogeneous (i.e. each player only cares the size of his piece). How is the cake divided in a subgame perfect equilibrium?

   (b) Suppose that the cake is not homogeneous and that players have different tastes. Assume that preferences are monotonic and continuous. That is, if P' is a proper subset of P, then each player prefers P to P'. For any two pieces P and P' such that a player strictly prefers P to P', there is piece Δ that is a proper subset of P such that the player prefers $P \setminus \Delta$ to $P' \cup \Delta$. Solving by backwards induction, prove or disprove the following claims:

      i. In any subgame perfect equilibrium, player 2 is indifferent between P_1 and P_2.

      ii. In any subgame perfect equilibrium, player 1 is indifferent between P_1 and P_2.