Problem 1. Prisoners dilemma

Two suspects are arrested for a crime and placed in two isolated rooms. Each ones of the suspects has to decide whether or not to confess and implicate the other. The rules are the following. If none of the suspects confesses, then each will serve 2 years in jail. If both of them confess and implicate each other, they will both go to prison for 4 years. However, if one prisoner confesses and implicates the other while the other one does not confess, the one who has cooperated with the police will be set free, while the other will spend 5 years in prison.

Define who players in this game are and what the possible strategies are. Formulate the game in strategic form (= give a matrix representation of the game). Is this game a zero-sum game or not-zero-sum game? Are there any dominating strategies? Find Nash equilibrium.

Problem 2. Multipath routing

Imagine that there 4 nodes A, B, C and D linked as it is shown on the figure. User 1 would like to send his data packets from B to D; user 2 would like to send his packets from A to C. First user can chose a route B-A-D or B-C-D. There are also two choices for the second user: A-B-C and A-D-C. Throughput experienced by a user depends on whether he is using a link alone or it is shared with another user. The vectors *(a; b)* attached to each link denotes a throughput a user experiencing over the link: *a* if he is doing it alone alone, and *b* if he shares it with another user.

Write a matrix to describe this game. Investigate if the game has Nash equilibrium and what would be a rational choice for the two users.