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Exercise No. 11

Peer-To-Peer Networks

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Exercise 17 *Game Theory*

Consider two users A and B of a file-sharing system. Each wants to download a file from the other for personal benefit. Uploading results in a negative benefit due to congested Internet connection. The individual benefits are given in the following:

- A gains a benefit of 6 whenever downloading from B.
- B gains a benefit of 5 whenever downloading from A.
- If A is downloading from B, then uploading a file to B reduces A's utility value by 2.
- If not downloading from B but only uploading to B, A has a utility value of -1, since the upload does not interfere with the download capacity.
- B gets a penalty for uploading to A of -3, regardless of the own download.

Answer the following questions:

1. What are the personal benefits for A and B in the four possible cases (downloading – uploading, user A – user B)?
2. What are the overall benefits in the four cases?
3. If both users try to maximize their personal benefit, what is the resulting case and benefit?
4. Develop a reward system, such that the overall best-case is reached even if both users remain egoistic!