CS 2443: Quiz 3

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- Total marks: 10.
- Read the question carefully and answer to the question only.
- Maintain academic honesty.

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1. Recall the GreedySchedule algorithm discussed in the class. Consider the following greedy strategies for the same problem. Prove or disprove its correctness. [2+2]

   (i) If no talks conflict, choose them all. Otherwise, discard the talk with longest duration and recurse.

   (ii) Choose the talk x that starts *last*, discard all talks that conflict with x, and recurse.

2. Consider the following sentence.

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   Draw the Huffman tree obtained by the output of the procedure BuildHuffman on the above input. What is the cost of the tree? [3]

3. Consider the stable matching algorithm explained in the class. Suppose there are 5 doctors $D_1, \ldots, D_5$ and 5 hospitals $H_1, \ldots, H_5$. The preference of list of the doctors and hospitals are listed below ($a > b$ implies that a is more preferred than b).

   Preference of doctors over hospitals:

   - $D_1 : H_1 > H_3 > H_4 > H_2 > H_5$.
   - $D_2 : H_5 > H_3 > H_4 > H_1 > H_2$.
   - $D_3 : H_4 > H_3 > H_2 > H_1 > H_5$.
   - $D_4 : H_5 > H_4 > H_3 > H_2 > H_1$.
   - $D_5 : H_4 > H_2 > H_3 > H_5 > H_1$.

   Preference of hospitals over doctors:

   - $H_1 : D_1 > D_2 > D_3 > D_4 > D_5$.
   - $H_2 : D_4 > D_2 > D_1 > D_3 > D_5$.
   - $H_3 : D_1 > D_2 > D_4 > D_3 > D_5$.
   - $H_4 : D_2 > D_3 > D_1 > D_4 > D_5$.
   - $H_5 : D_2 > D_3 > D_5 > D_4 > D_1$.

   Consider the matching $M = \{(D_1, H_1), (D_2, H_2), \ldots, (D_5, H_5)\}$. Is M a stable matching. Justify your answer. Explain the execution of the algorithm taught in the class on the above input. [1+2]