INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
CS21003 Algorithms I: Second Class Test 2021 Spring

Date of Examination: 20th February 2021
Duration: 35 minutes + 5 minutes (for scanning, concatenating, and uploading)
Full Marks: 10
Subject: CS21003 Algorithms I

Part II

1. On the death of the emperor, his personal safe where gold ornaments are kept is opened. It is found to have n items, each of integer value v_i. The emperor has three (3) heirs and ALL the items are to be distributed among the three heirs in such a way that the difference between the person who gets the largest and the person who gets the smallest share is minimized. No item can be broken down into smaller pieces prior to distribution. In order to solve this problem, you are to do the following:

   (a) Present a good recursive definition for the problem.

   (b) Convert this recursive definition to an efficient final algorithm and present the algorithm. Justify the reasons for your design choices.

   (c) Analyze the time and space complexity of the algorithm designed in part (b) above.

   (d) Show the working of your algorithm on the following example: $\{9, 4, 3, 1, 6, 11, 7, 8\}$.

   [2+4+2+2 Marks]

All the best
