Programming Assignment 2 - Rishab Dudhia (SID: 862141444)

a. First I implemented the regular merge sort algorithm. This uses two functions, both of return type void. However, to count the number of candies, I changed the return type of both functions to int and added an extra int parameter to both functions which represents the count of candies. The count of candies is updated for each call to sort() and merge() in the sort() function so that the next call will have the correct total passed into the new call. The value of total candies is increased at the end of the merge function where the value at the end of the passed in array is subtracted from the value at the front of the passed in array. The difference is added to the passed in total count of candies and the new total is returned. The initial call of the sort function is called in the main function where 0 is passed in as the total candies since the counting has not begun, and the program will recursively increase the total candies required. Once the recursion is complete, the int returned from the sort() function will be the total number of candies necessary.

b. To create a greedy algorithm that finds the least amount of people that need to be convinced, I realized that the greedy decision would be to convince the majority of the smallest sized department. To implement this algorithm, I read in all the sizes of the departments into an array and then passed the array into my function findMinPeople(). The first line of the function sorts the array from least to greatest. Then I created a variable to keep count of how many people need to be convinced. Knowing that there are n departments and all the departments have the same weight, I know that we only need to persuade the first $(n/2) + 1$ of the sorted departments since they have the least amount of people and a majority of the departments will still be reached. Then for each of the $(n/2) + 1$ department sizes of the sorted departments, I add half plus one of each

department size to the total number of people who need to be convinced. After the loop finishes, the variable of the total number of people to be persuaded is returned and this is the minimum number of people that need to be persuaded for approval.