# Assignment 6

# Due at the end of your lab

1. You are given a mixed problem of knapsack where some of the items are 0-1 and others are fractional. What approach will you take to solving it optimally? Note that 0-1 knapsack requires dynamic programming, while fractional knapsack requires only a greedy algorithm. Devise a solution to this mixed problem and implement it.
2. Consider the current era of digital records. You work in a large trading firm and there is a master list of all products traded by the firm. It is your job to create bit codes for all the items for transmitting electronic invoices for their sale etc. You also realize that you can siphon off some items due to a loophole in the company policy. Specifically, one invoice list can be sent by you to an address of your choice, and won’t be scrutinized by the IT or other departments if the length of the invoice note is within a stipulated number of bits. You have to use Huffman coding developed by another department, but your goal is to steal all of the most expensive items without attracting the scrutiny of the IT department. Thus the frequencies of the items need to be assigned by you and will be based on their total value. The knapsack has no physical limit. Any list of items all of whose codes written one after the other as a string will be shipped (fraudulently) in your favour, provided the total code length is within the restricted number of bits. The only limit is thus the length of the electronic invoice file and that is the knapsack capacity. You get the entire stock of any item listed regardless of the quantity. The bit codes are all integer lengths, and thus the problem is a 0-1 knapsack problem. The creativity needed is that you have to assign weights so that the huffman code is manipulated to maximize your loot.

Design an algorithm and implement code.