

COSC201: Tutorial Week 11

Greedy and Dynamic Programming Algorithms

1. Huffman coding is an example of a greedy algorithm for computing prefix codes that can be used to do lossless compression. It works in a bottom-up greedy fashion. Assume we have the following letter frequencies:

	a	b	c	d	e	f
frequency	45	13	12	16	9	5

- (a) Show the Huffman code tree with individual letters in the leaves of the tree, frequencies in the nodes, and 0 or 1 on the branches.
 - (b) Encode the following string “abdacadabda”.
 - (c) How many bits would be used if we used the same code length for each character?
2. Consider the following set of values and weights:

$$W = [20, 30, 10, 5, 15]$$

$$V = [100, 120, 60, 40, 20]$$

$$W_{\max} = 50.$$

- (a) Run through the recursive knapsack algorithm on the above problem. Show the full recursive call tree.
- (b) Run through the iterative knapsack algorithm on the above problem. Show the weight/items array in steps of 5 for the weight.