

## Group Exercise #2

Due 11:59PM, Monday March 1

### Instructions:

- 1) Find which group you are in from the following list (it is re-randomized since the last group).
  - Group 1: David M, Liam, ANDY
  - Group 2: Graylin, Aiden, Alora
  - Group 3: Oksana, Alex, Megan, Marshall
  - Group 4: David S, Kevin, Cale
  - Group 5: Talha, Garrett, Eddie
  - Group 6: Nemed, Luke, Keith
  - Group 7: Alejandra, Jonathan, Jacobo
  - Group 8: Nicole, Tuva, Jonah
  - Group 9: Hayden, Malachi, Kyleigh
- 2) Go to the discord server, introduce yourself in the channel for your group, and work out among your group who will work on which questions. Note that all channels are public.
- 3) Before the deadline discuss answers for each question in the group until there is consensus.
- 4) Create a video or videos going over the answers and upload to your channel.

### Questions

- 1) You have four letters to encode with these probabilities:

A	0.68
B	0.17
C	0.10
D	0.05

Build a Huffman coding tree from this data and give the bit codes associated with each letter.

- 2) A dictionary ADT is to be implemented with these characteristics:
  - a. Many items are inserted into the dictionary
  - b. It is very rare to search the dictionary for an item
  - c. It is common to return the dictionary as an array with the items in sorted order

What underlying data structure would you use to implement the dictionary and why is it best?

3) Here is some python code:

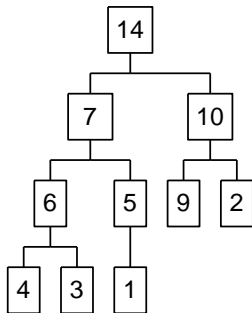
```
def foo1(var):  
    var.append("foo")  
  
def foo2(var):  
    var = []  
    var.append("hello")  
    var.append("world")  
  
list = ["bar"]  
  
foo1(list)  
print(list)  
  
foo2(list)  
print(list)
```

The output of this code is:

```
['bar', 'foo']  
['bar', 'foo']
```

Describe why the output is ['bar'] after calling foo1 but not changed to contain 'hello', 'world' after calling foo2.

4) Given the binary heap below:



- Show the heap after inserting an element with the value of 8.
- Show the heap after extracting the max value (use the original heap, not after inserting 8)
- Give pseudocode for a recursive algorithm that determines whether or not a binary tree is a max-heap.