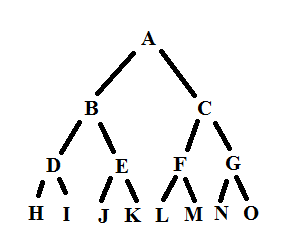
**CSC 1500 – Homework 8**

**(1)** Using the following tree, list the answers of the following questions. (*5 pts. each*)



(1.1) List all of the children of B.

D, E

(1.2) List all of the descendants of C.

F,G,L,M,N,O

(1.3) List all of the ancestors of N.

G,C,A

(1.4) List all of the siblings of J.

K

**(2)** Assume we have a full 4-ary tree, which contains 100 leaves. How many internal nodes are there, and how many nodes in total are there? (*10 pts.*)

100 = 1+(internal nodes\*(4-1))= 1+(3\*IN)

99 = 3in

Internal nodes = 33

Total nodes = 33 + 100 = 133

**(3)** Create a Max Heap tree given the following input values. (*10 pts.*)

{19, 7, 10, 55, 3, 42, 100, 8}

A black line drawing on a white background

Description automatically generated

**(4)** Create a binary search tree as discussed in class, using the given numbers in the order they’re presented. State if the resulting tree is has the attributes of being FULL, BALANCED, or COMPLETE. (*20 pts.*)

{37, 20, 18, 56, 40, 42, 12, 5, 6, 77, 21, 54}

A diagram of numbers and points

Description automatically generated’This tree is not full. This tree is not balanced, this tree is not complete.

**(5)** Given the following frequencies of letters appearing in a file, use Huffman Coding to determine the average number of bits used to encode a symbol, the binary code used to represent each bit, and the resulting binary tree. (*20 pts.*)

A: 0.08, B: 0.10, C: 0.12, D: 0.15, E: 0.20, F: 0.35

A screenshot of a computer game

Description automatically generated

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| LETTER: | BINARY: | BITS: | FREQ: | BIT\*FREQ |
| A | 000 | 3 | .08 | 0.24 |
| B | 001 | 3 | 0.1 | 0.3 |
| C | 100 | 3 | 0.12 | 0.36 |
| D | 101 | 3 | 0.15 | 0.45 |
| E | 01 | 2 | 0.2 | 0.4 |
| F | 11 | 2 | 0.35 | 0.7 |
|  |  |  | AVERAGE BITS: | 2.45 |

**(6)** Create an ordered, rooted tree that represents the infix form of the following equation. Then write out the prefix and postfix forms of the equation. (*10 pts.*)

((X\*Y) + (Y \* ((X+5) \* (Y+7))))/3

A math equation with a triangle

Description automatically generated

PREFIX: /+\*xy\*y\*+x5+y73

POSTFIX: XY\*YX5+Y7+\*\*3/

**(7)** What are the odds, in a hand of five cards, of getting two matching pairs of one type of card, and three matching pairs of another? (For example, getting “Two Aces, Three Kings” or “Two 4’s, Three Queens”) (*10 pts.)*

Out of the 13 face types that can form pairs, select one of those face types, of one of those face types, select 2 cards from the 4 of that face type. From the remaining 12 face types, select one of those face types, of the 4 cards available from that remaining face type, select 3 of the cards.

*A white paper with black numbers and symbols

Description automatically generated*

(13\*6 \* 12 \* 4) /2598960 = 3744/2598960