Part 1.

Encoded output from checkpoint1.txt:

11100100111001001110010011100100111001001110010011100100111001001110010011100100111001001110
0100

For the header, line 98, 99, 100, 101 are 10. Others are 0.

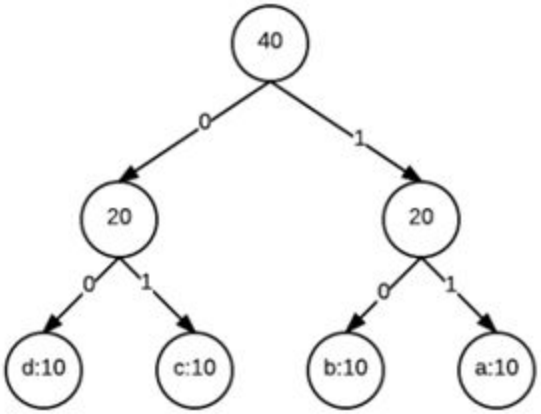
Encoded output from checkpoint2.txt:

00000000100100100101010101010101011111111111111111111111111111111110101010101
0101010010010010010000000

For the header, from line 98 to 101, the values are 4, 8, 16, and 32, respectively. Others are 0.

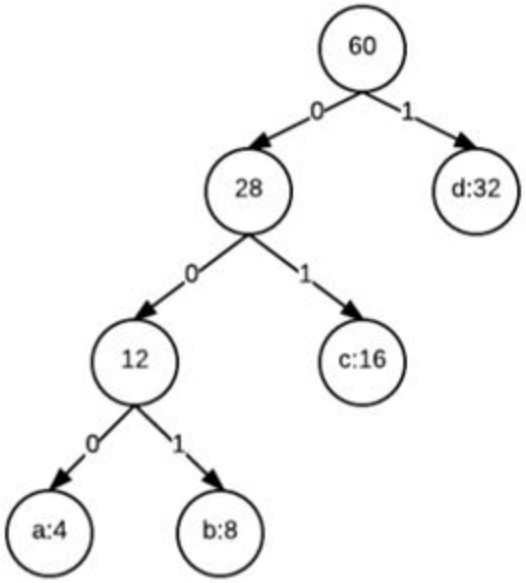
Part 2.

The Huffman Tree for checkpoint1.txt:



Before we start, we exclude every leaves with 0 frequency from the forest. For the Huffman coding tree, the symbol with lower frequency has higher priority. But since in this checkpoint1.txt, a, b, c, and d all have the same frequency so we use the values of symbol to break tie. The large symbol will be added to the tree first. First is d and then c, left child is 0 and right child is 1, then we push back their parent with the sum of their frequencies. Then b and a come out since they have lower frequencies, then we push back their parent with the sum of their frequencies. Then we just pop out the two nodes with 20 and we are done.

The Huffman Tree for checkpoint2.txt:



Before we start, we exclude every leaves with 0 frequency from the forest. The node a has lowest frequency and b has second lowest frequency so we pop out these two nodes and add a parent which left child is a marked by 0 and right child is b marked by 1. Then we push back their parent to the forest. Then we pop out the two nodes with frequency 12 and c with frequency 16 and add a parent which left child is node with frequency 12 marked by 0 and right child is c marked by 1 and then we push back their new parent with frequency 28 which is the sum of their frequencies. At last, we pop out the last two nodes with a parent added and finish building the tree.

Part 3.

Checkpoint1.txt

11100100111001001110010011100100111001001110010011100100111001001110010011100100
11100100111001001110010011100100111001001110010011100100111001001110010011100100
Same.

Checkpoint2.txt

00000000100100100101010101010101011111111111111111111111111111111110101010101
01010100100100100100000000

00000000100100100101010101010101011111111111111111111111111111110101010101
01010100100100100100000000
Same.