

Additional Midterm Questions Study Guide (Draft)

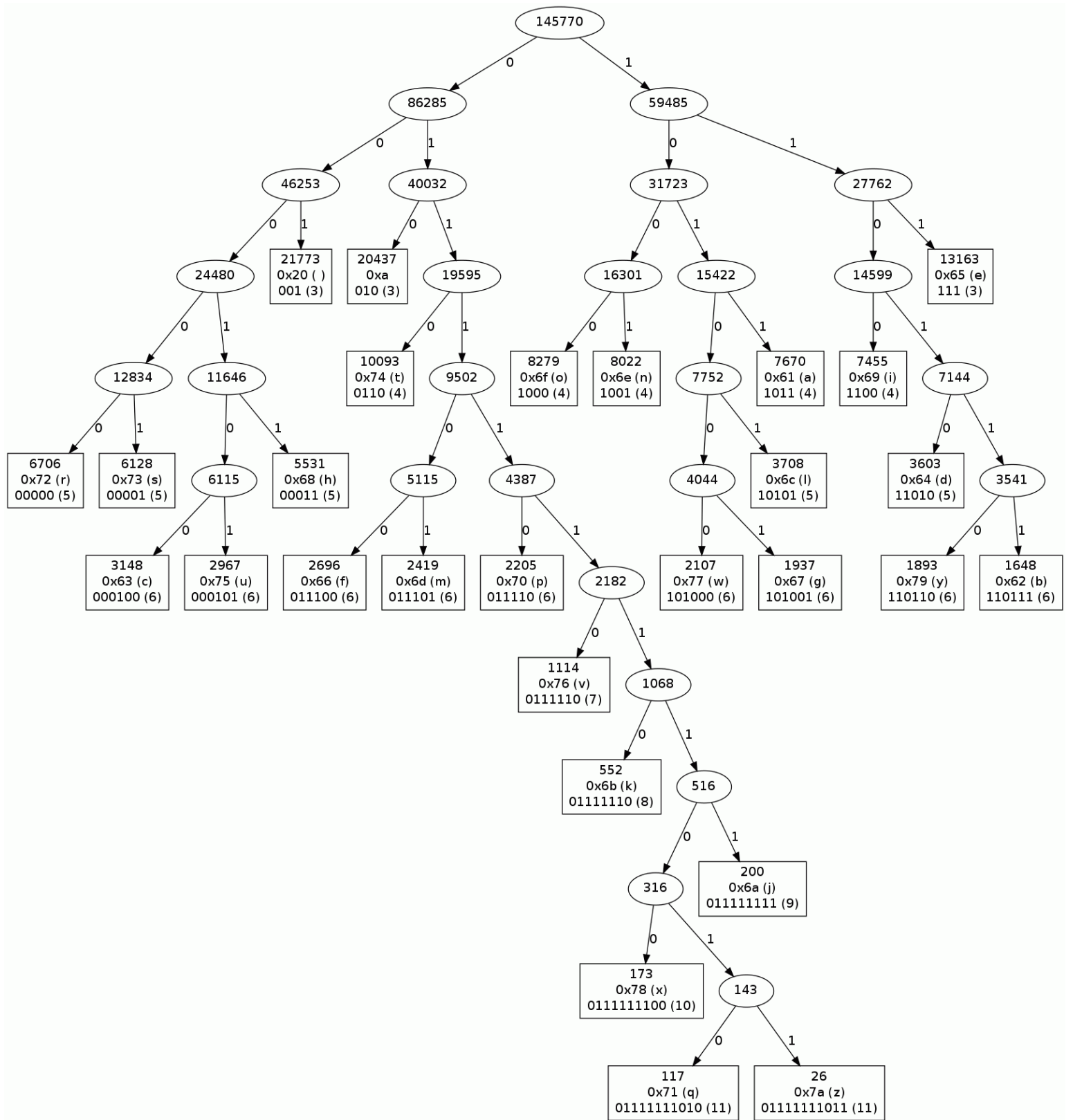
1 [asymptotic complexity]: What is the asymptotic complexity of the following function

```
int mystery(int a, int b, int c) {  
    if (a > 1) {  
        if (c) {  
            return mystery( a + 1, b + 1, 0);  
        } else {  
            return mystery(a / 2, b + 1, 1);  
        }  
    } else {  
        return b;  
    }  
}
```

2 [Huffman]: given the following Huffman tree, decode this message:

```
1010 0110 0010 0011  
0100 0110 1010 0010  
1000 1000 1111 1100  
0110 0010 0100 1110  
1101 0000 0010 1000  
0000 1111 0111 1111  
0010 1101 1101 0000
```

1



3 The following program does not crash, but produces garbage output. Why?

```
#include <cstring>
#include <iostream>
using namespace std;

class Node {
public:
    char data[100];
    Node* left;
    Node* right;
};

Node* GetNode() {
    Node nodes[10];
    return FreeNode(&nodes[2]);
}

Node* FreeNode(Node *p) {
    return p + 2;
}

char* foo() {
    Node* node = GetNode();
    strcpy(node->data, "message in a bottle");
    return node->data;
}

int main () {
    char * message = foo();
    cout << message << endl;
}
```