C S 272/463 Introduction to data structures
Fall 2019
Lab 11: Recursive trace, recursive reasoning, and recursive function analysis

1 Learning objectives

Objective 2 (recursive thinking) in course syllabus.

2 Requirements

2.1 Detailed instructions for program design and implementation

Please answer the following questions.
Please put your solutions to a **word** file.
Let us define `gcd(a,b)` to be the greatest common divisor for two non-negative integers.

1. (30 points) You are given the following code to calculate `gcd(a,b)`.
   Please draw the recursive trace for a function call `gcd(8,6)`.

```
int gcd(int a, int b) {
    /* Pre: a>b i b>=0*/
    /* Post: gcd(a, b) = GCD(a, b) */
    if(b==0) return a;
    else return gcd(b, a%b);
}
```

2. (30 points) Please reason the correctness of the above recursive function to calculate the value of `gcd(a,b)`.
3. (40 points) Please analyze the time complexity of your towers of Hanoi solution.

3 Submission instructions

- Submit through canvas a zipped file containing your Word file.

4 Grading criteria

(1) The score allocation is already put in the questions.

(2) 5 points will be deducted if submitted files (including files types, file names, etc.) do not follow the instructions.