

3) (10 pts) DSN (Stacks)

(a) (6 pts) Convert the following infix expression to postfix using a stack. Show the contents of the stack at the indicated points (1, 2, and 3) in the infix expression.

$$\mathbf{A} + \mathbf{B} * \left(\left(\mathbf{C} / \mathbf{D} \right) + \mathbf{E} * \mathbf{F} \right) * \mathbf{G}$$

(
*
+

1

*
+
(
*
+

2

*
+

3

Resulting postfix expression:

A	B	C	D	/	E	F	*	+	*	G	*	+							
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Grading: 1 point for each stack, 3 points for the whole expression (partial credit allowed.)

(b) (4 pts) Whenever a recursive function is called, the function calls go onto a call stack. The depth of the call stack is the number of different recursive calls on the stack at a particular point in time, which indicates the number of different recursive calls that have started, but have not completed. What is the maximum stack depth of the call stack when the function `fib(10)` is executed? Is this maximum stack depth equal to the number of times the recursive function, `fib`, is called? Assume the implementation of the Fibonacci function shown below:

```
int fib(int n) {
    if (n < 2) return n;
    return fib(n-1) + fib(n-2);
}
```

Maximum Stack Depth: **10** (Grading: 2 pts for 10 or 9, 1 pt to be within 3, 0 pts otherwise)

Is Max Stack Depth equal to the # of recursive calls?
(Circle the correct answer.)

YES

NO

Grading: 2 pts correct, 0 otherwise

Computer Science Foundation Exam

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Section I B

DATA STRUCTURES

SOLUTION

**NO books, notes, or calculators may be used,
and you must work entirely on your own.**

Name: _____

UCFID: _____

NID: _____

Question #	Max Pts	Category	Score
1	10	DSN	
2	5	ALG	
3	10	ALG	
TOTAL	25		

You must do all 3 problems in this section of the exam.

Problems will be graded based on the completeness of the solution steps and not graded based on the answer alone. Credit cannot be given unless all work is shown and is readable. Be complete, yet concise, and above all be neat. For each coding question, assume that all of the necessary includes (stdlib, stdio, math, string) for that particular question have been made.