COMP.2030 LAB 11/29/23

NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. A recursive C function, recur, is declared as

recur: pushq %rbp

movq %rsp, %rbp

subq $16, %rsp

movq %rdi, -8(%rbp)

movq %rsi, -16(%rbp)

cmpq $0, -8(%rbp)

jne .L2

movl $-1, %eax

jmp .L3

.L2:

cmpq $10, -16(%rbp)

jne .L4

movl $0, %eax

jmp .L3

.L4:

movq -8(%rbp), %rax

movq (%rax), %rax

cmpq -16(%rbp), %rax

jle .L5

movq -8(%rbp), %rax

addq $8, %rax

movq (%rax), %rax

movq -16(%rbp), %rdx

movq %rdx, %rsi

movq %rax, %rdi

call recur

addl %eax, %eax

jmp .L3

.L5:

movl $1, %eax

.L3:

leave

ret

int recur(long \*x, long y)  
  
is compiled into the x86 code on the right.  
Complete the C code of the function recur below.

int recur(long \*x, long y) {

1. The function long switch\_prob(long x, long n) is disassembled as shown below.





long switch\_prob(long x, long n) {

long result = x;

switch(n) {

1. The following code transposes the elements of an MxM array, where M is a constant defined by #define. When compiled, gcc generates the assembly code for the inner loop of the function as shown on the right.

![Table

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1. Which register holds a pointer to array element A[i][j]?
2. Which register holds a pointer to array element A[j][i]?
3. What is the value of M?