

**CS 240**  
**Laboratory 8 Assignment**  
**X86 Disassembly and Reverse Engineering**

On the left below is the C code for a function **test\_prime**.

On the right below is the corresponding X86 code produced by compiling the C code for the function **test\_prime**

C code	X86 code
<pre>long int test_prime(long int num) {</pre>	<pre>0x0000000000400478 : mov  %rdi,-0x18(%rsp) 0x000000000040047c : movq \$0x2,-0x8(%rsp) 0x0000000000400484 : jmp  0x4004a9</pre>
<pre>    for (long int i =2; i &lt;= num/2;++i) {</pre>	
<pre>        if (num % i == 0) {</pre>	<pre>0x0000000000400485: mov  -0x18(%rsp),%rax 0x0000000000400486: movq \$0x0,%rdx 0x0000000000400491: idivq -0x8(%rsp) 0x0000000000400495: mov  %rdx,%rax 0x0000000000400498: test %rax,%rax 0x000000000040049b: jne  0x4004a4 0x000000000040049d: mov  \$0x0,%rax 0x00000000004004a2: jmp  0x4004c7</pre>
<pre>            return 0;</pre>	
<pre>        }</pre>	<pre>0x00000000004004a4: addq \$0x1,-0x8(%rsp) 0x00000000004004a9: mov  -0x18(%rsp),%rax 0x00000000004004b8: sar  %rax 0x00000000004004bb: cmp  -0x8(%rsp),%rax 0x00000000004004bf: jge  0x400485</pre>
<pre>    }</pre>	
<pre>    return 1;</pre>	<pre>0x00000000004004c1: mov  \$0x1,%rax</pre>
<pre>}</pre>	<pre>0x00000000004004c7: retq</pre>

Answer the questions below assuming that *test\_prime* is called with **num** = 7

1. What is the starting address of **test\_prime** in memory?
2. What register is the argument stored in when the assembler code begins execution?
3. Circle and label the statements (there are two) that set the return value for the function.
4. Circle and label the X86 statements that test the condition in the **for** loop. Describe how  $\text{num}/2$  is calculated in this code:
5. Circle and label the X86 statements that implement testing the conditional for the *if* statement in the body of the loop.
6. Look up the *idivq* X86 instruction, and explain how the  $\text{num}\%2$  is accomplished with the given code: