

CS 301 Midterm Exam (F22)

Please close any communication channels that let you interact with other people. Any non-living tools or references (calculator, course lecture notes, Google, Stack Overflow, NetRun, Wikipedia, etc) are totally OK.

If you don't know the answer, take a note of the question number and come back to it later, but please finish up by the end of class today. (Don't burn most of your time trying to find one answer!)

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0.) What is your name? (Hopefully I also get this automatically from your login, but just in case...)

Jewel Maldonado

0.B.) This is a totally optional area for you to scribble anything that you would normally have written in the margins--like fixes for the questions, project ideas, etc. (But if it's urgent, Zoom or email or Discord is better.)

I think number 14 should be multiple choices

1.) What value will this code return?

```
mov rax,3
add rax,2
ret
```

☐ 3

☐ 2

☒ 5

☐ It crashes

☐ Other: _____

Clear selection

2.) Pick column that best describes each thing.

	scratch register	preserved register	not a register
rax	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
rbx	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
rcx	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
rhx	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

Clear selection

3.) What's the deal with "preserved" registers? (Check all that apply.)

- ☐ You can't ever use them for anything, no matter what you do.
- ☒ You can use them, but you need to restore their value before you return.
- ☒ Technically rsp is preserved, but changing it breaks both pop and ret.
- ☐ Preserved registers can only be used by the operating system, not normal code.

3.) Is this an infinite loop?

```
mov rax, 0
start:
    add rdi,1
    cmp rax,10
    jl start
```

☒ Yes

☐ No

☐ Maybe, depends on the values of other registers

Clear selection

5.) Which line of assembly is most similar to the C++ code "int x = *myPtr"? (The type of myPtr is "int *")

- ☐ call malloc
- ☐ mov rax,QWORD [rdi]
- ☒ mov eax,DWORD[rdi]
- ☐ mov rax,rdi

Clear selection

6.) If the keyboard input is '78321', and you call getch, what number would you expect to find in register rax?

☐ 7

☐ 78321

☐ -1

☐ 0x37

☐ No way to tell

☒ Other: well it will return 0x37 cause it is putting that 7 onto the ascii buuuut t

Clear selection

7.) Some C code does "long *arr = malloc(80);". How many long ints can you use in arr now, and why?

80! because by doing malloc(80) you are alloc.

8.) You're trying to add an assembly function "runCrypto" to a large project that includes several languages, but is mostly written in C++. The C++ compiles, and the assembly compiles, but you're getting a link error 'Undefined reference to "runCrypto(long *)" at build time. What is the problem?

- ☐ You need to rethink this: C++ and assembly cannot coexist in the same program.
- ☐ You need to use the correct registers to pass parameters into runCrypto.
- ☐ You need to uninstall Windows and install Linux, no matter who says it's a bad idea.
- ☒ You need to add 'extern "C"' to the C++ prototype for runCrypto.

Clear selection

9.) In assembly, if rdi contains a pointer to an array of 64-bit long integers, how far does "add rdi,1" move that pointer?

☐ 1 bit

☐ 1 hex digit

☐ 1 byte

☐ 1 long

☒ Doing this will crash.

☐ Other: _____

Clear selection

10.) In assembly, if rdi contains a pointer to an array of 64-bit long integers, and you want to access array index rcx, what code would you do that?

call [rdi+8*rcx]; ??? is it right? I hope so

11.) You want to print a "long int x" using printf, in decimal. Which of these will work in C/C++?

- ☐ printf(x);
- ☐ printf("%d",x);
- ☒ printf("%ld",x);
- ☐ printf("%s",x);

☐ Other: _____

Clear selection

12.) You've declared a string in assembly as "str: db 'OK'". When you print it, you get "OKH2e@". Briefly, why?

You forgot your terminating 0 so now it keeps

13.) You want to call the C/C++ function pointer "func_t f". How do you do this?

☐ f;

☒ f();

☐ ft;

☐ f->();

☐ You can only call a function pointer from assembly, not C/C++.

☐ Other: _____

Clear selection

14.) For your new large commercial project, a coworker suggests writing everything in assembly because "We need maximum performance". What's the best response?

- ☐ No, we're using Python because it's awesome. No other languages should be contemplated for any purpose.
- ☐ Yes, Dr. Lawlor not only taught me assembly, he clearly demonstrated that it's the best tool for every programming task.
- ☒ Getting simple things done is much harder in assembly. Why don't we start in C++, and actually measure the performance?
- ☐ This doesn't need to get political--just quit the job. Yolo.

Clear selection

15.) This assembly code is equivalent to what in C++?

```
1  ; Input: rdi is D, rsi is S
2  cmp rdi,rsi
3  jg nope
4      cmp rdi,0
5      jl nope
6      mov rax,99
7      ret
8
9  nope:
10     mov rax,0
11     ret
```

☐ return 0;

☐ while (D>S) if (D<0) return 99;

☐ if (D>S || D<0) return 99; else return 0;

☒ if (D<=S && D>=0) return 99; else return 0;

☐ if (D>S && D<0) return 99; else return 0;

☐ Other: _____

Clear selection

16.) You're taking assembly this semester? Why do they even bother teaching that ancient crap?!

☐ I know, right?

☐ It's a good way to understand how to make all those transistors work together, so we can solder up our own CPUs.

☐ 100% assembly is absolutely the only choice if you want to be a REAL programmer.

☒ Other: Its interesting and fun, also if you think about it you could become a s

Clear selection

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☒ OK, my network is working!

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