

Student ID _____

Quiz 5
CSE 131
Winter 2014

Name _____

Signature _____

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1. What are the values of a and b after the following Reduced-C statements?

```
bool a = false;
bool b = true;
b = false || (a = true);
```

Value of a is _____ Value of b is _____

What are the values of a and b after the following Reduced-C statements?

```
int a = 5;
int b = 10;
a = b++;
```

Value of a is _____ Value of b is _____

Use virtual register notation for the following.

Change the following into three instructions which are most likely a time improvement over the single instruction when it comes to actual code generation.

```
r2 = r4 * 130
```

What term describes this particular kind of peephole optimization?

Given the following variable definitions

```
static int c = 42; // initialized static variable
int d; // uninitialized global variable
```

write the SPARC assembly code which should be generated to properly allocate space for each along with their initial values and alignment and to ensure proper access/visibility to these variables if another file is linked to this code's object file.

```
.section _____
.align _____
c: _____ 42
.section _____
.align _____
d: _____
_____ d
```

2. Assume local int * variables a and b are allocated space in a function's stack frame at memory locations

```
int * a    %fp-4
int * b    %fp-8
```

Complete the SPARC assembly instructions for the line

```
b = a++;
```

that a Reduced-C compiler from this quarter might emit.

You can assume all the initializations of the local variables have been performed. Just emit the code to perform the expression on the right side of the assignment statement and assign the result into b.

We will need to use a temporary or two on the stack, so we will use location %fp-12 for tmp1 and %fp-16 for tmp2.

Follow the basic ld/ld/compute/st model.

```
ld    [_____], %o0
_____ %o0, [%fp - 12]      ! tmp1 = a

ld    [_____], %o0
_____ _____, %o1
add   %o0, %o1, %o0
_____ %o0, [_____]      ! tmp2 = a + ?

_____ [_____], %o0
_____ %o0, [_____]      ! a = tmp2

_____ [_____], %o0
st    %o0, [_____]      ! b = tmp1
```

Which part of the entire compilation sequence clear through to program execution is responsible for:

- _____ expanding # directives
- _____ reporting syntax errors
- _____ creating an executable image from multiple object files
- _____ getting the executable image from disk into memory
- _____ translating assembly source code into object target code
- _____ translating C source code into assembly target code
- _____ resolving undefined external symbols with defined global symbols across modules
- _____ having the operating system report a segmentation fault (core dumped) message
- _____ ensuring the bss segment is set up and zero-filled
- _____ reporting multiply-defined symbols

- A) C Preprocessor
- B) C Compiler
- C) Assembler
- D) Linkage Editor
- E) Loader
- F) Program Execution

Specify the scope/visibility of each of the following:

- _____ global functions
- _____ internal static variables
- _____ external static variables
- _____ local variables
- _____ global variables
- _____ formal parameters
- _____ static functions

- A) global scope
- B) file scope
- C) local/function scope

What question(s) would you like to see on the final exam?