Student ID _____   **Quiz 5**   **Name** _____
                                    CSE 131
Signature _____   **Winter 2013**   **Login name** _____

1. Give the order of the typical C compilation stages and on to actual execution as discussed in class

A – Program Execution   B – ld (Linkage Editor)
C – Loader   D – ccomp (C compiler)
E – cpp (C preprocessor)   F – Source file (prog.c)
G – prog.exe/a.out (Executable image)   H – as (Assember)
I – Assembly file (prog.s)   J – Object file (prog.o)
K – Segmentation Fault (Core Dump) / General Protection Fault

gcc ____ –> ____ –> ____ –> ____ –> ____ –> ____ –> ____ –> ____ –> ____ –> ____

Explain the main difference that the compiler does/does not do in <u>code gen</u> for an `extern` global variable declaration vs. a global variable definition. Be specific.

Give 4 examples of operators/expressions/constructs in this quarter's version of Reduced-C that evaluate to a modifiable l-val. Use words vs. code. For example, "the arrow operator / struct member access via a pointer to struct" – <u>so now you cannot use the arrow operator as one of your answers</u>.

1) _____

2) _____

3) _____

4) _____

Explain the main difference that the compiler does/does not do in <u>code gen</u> for a `static` variable definition vs. a global variable definition. Be specific.

What C/C++ keyword is used to turn off optimizations for variables for "unusual" memory - say interfaces to

devices/hardware? _____

What are the values of `a` and `b` after the following Reduced-C statements?
```
bool a = true;
bool b = true || (a = false);
```

Value of `a` is _____   Value of `b` is _____

What do you do differently in <u>code gen</u> to increment a pointer vs. incrementing a scalar like an int?

Say you have only the following C variables you can use:

```
int a[42];
int *ptr;
```

Write a single line of code to assign `ptr` to be pointing to (hold the address of) the second byte in memory of `a` (the second byte of `a[0]`). a is the address of the first element in the array and the first byte of that first element. We want to assign `ptr` to be pointing to the second byte of the first element. Yes, it will be misaligned for an int.

`ptr =`

<u>Use virtual register notation for the following</u>.

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 * 510`

_____

_____

_____

What term describes this particular kind of peephole optimization?

Use the numbers 1 through 4 to indicate when you would expect to see each error listed below (assuming a *compiled*, not an interpreted, language).

   (1) compile-time   (2) link-time   (3) load-time   (4) run-time

_____   Error message: Left-hand side is not a modifiable l-value.

_____   Running "gcc a.o b.o" gives the message "Multiple definition of 'main' ".

_____   An "array-index-out-of-bounds" error using a non-constant index expression.

_____   Undeclared identifier "foo".

_____   An "array-index-out-of-bounds" error using a constant-valued index expression.

_____   Segmentation fault.

_____   Running "gcc someModule.o" gives the message "Undefined reference to 'main' ".

_____   Non-addressable argument of type %T to address-of operator.

_____   Bus error.

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