1. Project II Code Gen – Phase II.3:
What is the output of the following Reduced-C program:

```
int a = 3;
int b = 7;
int c;

function : int foo( int & x, int y )
{
  int z;

  y = x + 3;
  x = y + 3;
  z = x + y;

  cout << x << endl;
  cout << y << endl;
  cout << z << endl;

  b = x + 4;

  return x + 3;
}

function : int main( )
{
  c = foo( a, b );

  cout << a << endl;
  cout << b << endl;
  cout << c << endl;

  return 0;
}
```

Output

Fill in the blanks below to simulate the above in C. Basically what is really happening under the code.

```
int a = 3;
int b = 7;
int c;

int
foo( _____ x, _____ y )
{
  int z;

  _____ = _____ + 3;

  _____ = _____ + 3;

  z = _____ + _____;

  printf( "%d\n", _____ );

  printf( "%d\n", _____ );

  printf( "%d\n", z );

  b = _____ + 4;

  return _____;
}
```

```
int
main( )
{
  c = foo( _____, _____ );

  printf( "%d\n", a );
  printf( "%d\n", b );
  printf( "%d\n", c );

  return 0;
}
```

2. 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.

What C/C++ compiler option should you give to produce a `.s` file from a .c file? _____
What C/C++ compiler option should you give to produce a `.o` file from a .c file? _____

Match the compilation process with the various tasks done in the compilation sequence.

A) Loader   B) Linkage Editor   C) C++ Compiler   D) Assembler   E) C++ Preprocessor

_____ zero fills the BSS segment in memory.

_____ puts globally defined symbols in the export list of the resulting object file.

_____ translates assembly code into machine code.

_____ combines all object modules into a single executable file.

_____ performs name mangling of function names.

_____ expands # directives from its input high-level language (HLL).

_____ performs semantic analysis on its input high-level language (HLL).

_____ takes an executable file on disk and makes it ready to execute in memory.

_____ performs syntax analysis on its input high-level language (HLL).

_____ resolves undefined external symbols with defined global symbols in other modules.

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

```
r1 = r4 * 510
```
_____

_____

_____

What term describes this particular peephole optimization? _____

Variables declared to be _____ will not be optimized by the compiler.

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