

Signature _____

Quiz 5
CSE 131B
Spring 2007

Name _____

Login name _____

Student ID _____

1. Given the following Oberon code fragment:

Oberon

```
VAR x : INTEGER;
VAR p : POINTER TO INTEGER;

BEGIN
  x := 5;

  new(p);

  p^ := x;

  COUT << p^;

  RETURN 0;
END.
```

Write the equivalent translated unoptimized SPARC Assembly language statements emitted by the code generator for the marked statement only. You can use one of a couple different ways to access global vars.

```
.global main

/* Code for format string for outputting an integer. */

.section ".bss"
.align 4
x:      .skip 4
p:      .skip 4
globals:

.section ".text"
main:
  save    %sp, -96, %sp
  /* Code for x := 5; -- DO NOT WRITE! ASSUME THIS IS CORRECT. */
  /* Code for new(p); -- DO NOT WRITE! ASSUME THIS IS CORRECT. */

  /* You write the SPARC assembly code generated for p^ := x; here. */

  /* Code for COUT << p^; -- DO NOT WRITE! ASSUME THIS IS CORRECT. */
  /* Code for RETURN 0; -- DO NOT WRITE! ASSUME THIS IS CORRECT. */
  mov     %g0, %i0
  ret
  restore
```

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

a) resolving undefined external references with defined global references in other modules

b) ensuring the bss segment is set up and zero-filled

c) translating Oberon source code into assembly target code

d) getting the executable image from disk into memory

e) translating assembly source code into object target code

f) creating an executable from multiple object files

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

4. Perform step-wise peephole optimization on the following window of pseudo three-address instructions (only three operands are allowed in an instruction – up to two source and one destination):

```
... other instructions ...  
r5 = 4 * 5           _____  
r1 = r2 + r5         _____  
r5 = 17 + r3         _____  
... other instructions ...
```

Name the type of optimization done in the first transformation.

Name the type of optimization done in the second transformation.

Name the type of optimization done in the third transformation.

5. What question would you most like to see on the Final? (1 pt)