**CS 4250 Programming Languages Fall 2018**

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**KEY TO QUIZ #3 [16 points]**

1. [1point] List six most important variable attributes:

*Answer:* name, address, value, type, lifetime and scope.

1. [2 points] Will you describe type binding for both explicit and implicit declarations as static or dynamic? Why?

*Answer:* this binding is static because it occurs at compile time.

1. [2 points] Define a lifetime of a variable.

*Answer*: the lifetime of a variable is the time during which it is bound to a specific memory location; this is a time period between allocation and deallocation of the memory cell for the variable.

1. [3 points] (a) Describe how explicit heap-dynamic variables come to existence and vanish.

*Answer*: they are allocated and deallocated by specific run-time instructions written by a programmer: for example, function calls in C and operators in C++.

(b) Which attribute is not applicable to such variables?

*Answer:* they don’t have names.

1. [8 points] Consider the following C program:

void fun (void) {

int a, b, c; /\* definition 1 \*/

. . .

while ( . . .) {

int b, c, d: /\* definition 2 \*/

. . . < - - - - - - - - - 1

while ( . . . ) {

int c, d, e; /\* definition 3 \*/

. . . < - - - - - - - - - - 2

}

. . . < - - - - - - - - - - 3

}

. . . < - - - - - - - - - - - - 4

}

For each of the four marked points in this function, list each visible variable, along with the number of the definition statement that defines it:

|  |  |  |
| --- | --- | --- |
|  | Variable name | Number of definition statement |
| Point 1 | a | 1 |
| b | 2 |
| c | 2 |
| d | 2 |
|  |  |
| Point 2 | a | 1 |
| b | 2 |
| c | 3 |
| d | 3 |
| e | 3 |
| Point 3 | a | 1 |
| b | 2 |
| c | 2 |
| d | 2 |
|  |  |
| Point 4 | a | 1 |
| b | 1 |
| c | 1 |
|  |  |
|  |  |