CSCE 531 Spring 2008

Quiz 4

Assigned Friday, 08-02-08

1. Match:

   (a) Command
   (b) Declaration
   (c) Expression

   with

   (a) Is evaluated to yield a value.
   (b) Is executed to change the value of a variable or to change the input or output streams.
   (c) Is elaborated to produce a binding, usually to allocate memory, and sometimes to initialize variables.

   Answer: 1-2, 2-3, 3-1.

2. Recall that, in denotational semantics, the *state* is a triple `<mem, i, o>`.

   (a) Which component(s) of the state are changed by a *read* instruction? **Answer:** i, mem
   (b) Which component(s) of the state are changed by a *write* instruction? **Answer:** o (only)
   (c) Which component(s) of the state are changed by an assignment? **Answer:** mem

3. What is the denotational semantics of the following program, where the initial input stream contains only the integer z?

```
read(n);
i := n+1;
write(i);
```

   Hint: it is a very short answer! **Answer:** `<z+1>`. Also acceptable: $z + 1$, although technically the answer is a sequence.

4. Consider the following grammar:

```
<prog> ::= <stats>.
<stats> ::= <stat> | <stat>;<stats>
<stat> ::= <ass-stat>
<ass-stat> ::= <ident> := <expr>
<ident> ::= a | b | c
<expr> ::= 9
```

Give a derivation of `b := 9;c := 9.` from the start symbol `<prog>`.

```
<prog>=><stats>.=><stat>;<stats>.=><stat>;<stat>.=><ass-stat>;<stat>.
=><ass-stat>;<ass-stat>.=><ident>:=<expr>;<ass-stat>.
=>b:=<expr>;<ass-stat>.=>b:=9;<ass-stat>.=>b:=9;<ident>:=<expr>.
=>b:=9;c:=<expr>.=>b:=9;c:=9.
```