Principles of Programming Languages - Quiz I

K. Subramani
LDCSEE,
West Virginia University,
Morgantown, WV
{ksmani@csee.wvu.edu}

1 Instructions

1. The quiz is to be turned in by $11:50$ am.
2. Each question is worth 3 points.
3. Attempt as many problems as you can. You will be given partial credit, as per the policy discussed in class.

2 Problems

1. Categorize the errors that can occur in a program, with an example of each category.
2. Let $\Sigma = \{0, 1\}$ denote an alphabet. Let $L \subseteq \Sigma^*$ denote the language which consists of all strings that start with 0 and end with 1. Write a regular expression **and** a CFG corresponding to L.
3. Consider the CFG $G = \langle V, T, P, S\rangle$, with $V = \{S\}$, $T = \{0, 1\}$ and P given by:

   $$S \rightarrow 0S1 \mid 1S0 \mid \epsilon$$

   Argue that every string in $L(G)$ has an equal number of 0s and 1s.
4. Consider the CFG $G = \langle V, T, P, S\rangle$, with $V = \{S\}$, $T = \{a\}$ and P given by:

   $$S \rightarrow S \cdot S \mid a$$

   Write the set equation corresponding to this grammar and give a solution to this equation.
5. Consider the following block of **C** code:

```
#include <stdio.h>

int a, b;

int p(void)
{
   int a, p;
   a =0; b=1; p=2;
   return p;
}
```

```
void print( void)
{
  printf(``%d\n%d\n'',a,b);
 }

void q(void)
{
  int b;

   a= 3; b=4;
   print();
}

main()
{
  a=p();
  q();
}
```

What values will be printed, when the program is parsed using (a) Lexical scope, and (b) Dynamic scope?