

# CMPT 383

## Quiz #4

### October 11, 2005

- 1) Prove that the following grammar is ambiguous:

```

<S> ::= <A>
<A> ::= <A>+<A> | <id>
<id> ::= a | b | c

```

- 2) Convert the following EBNF to BNF:

```

<S> ::= <A>{b<A>}
<A> ::= a[b]<A>

```

- 3) Consider the following incomplete attribute grammar with nonterminals  $A, B, C$ , and terminals  $d$  and  $e$ . The start symbol is  $A$ . The attributes are assigned to these grammar symbols as indicated by the table below.

	A	B	C	d	e
<b>synthesized</b>	<i>abel, boole</i>	<i>cantor</i>	<i>descartes</i>	<i>(none)</i>	<i>(none)</i>
<b>inherited</b>	<i>(none)</i>	<i>euler</i>	<i>fermat</i>	<i>gauss</i>	<i>(none)</i>

The grammar has the following 4 productions labeled  $p, q, r$ , and  $s$ .

```

p: <A> ::= <B>d
q: <B> ::= <C><A>
r: <B1> ::= <B2>e<C>
s: <C> ::= d<A>

```

List the defined attribute and used attributes occurrences.

- 4) Compute the weakest precondition for the following sequence of assignment statements and its postcondition:

```

a = 3*(2*b+a);
b = 2*a-1
{b > 5}

```

- 5) Perform the pairwise disjointness test for the following grammar rules:

```

<A> → a<B> | b | c<B><B>
<B> → a<B> | b<A> | a<B>b

```

- 6) Assume the following Ada program was compiled and executed using static scoping rules. What value of  $X$  is printed in procedure `Sub1`? Under dynamic scoping rules, what value of  $X$  is printed in procedure `Sub1`?

```
procedure Main is
  X : Integer;
  procedure Sub1 is
    begin          -- of Sub1
      Put(X);
    end;          -- of Sub1
  procedure Sub2 is
    X : Integer;
    begin          -- of Sub2
      X := 10;
      Sub1
    end;          -- of Sub2
  begin          -- of Main
    X := 5;
    Sub2
  end;          -- of Main
```