

# CS 410 Final Exam Fall 1999 [Bono]

December 14, 1999

Solution Sheet ( 4 pages )

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## Problem 1

Part A : NFA, regular expression

Part B : DFA, NFA

Part C : lex (OR flex), lexical analyzer (OR DFA), regular expression

## Problem 2

Part A : function call or dispatch

Part B : save current fp value on the stack

## Problem 3

$X^*4 \rightarrow X \ll 2$

$X^*2 \rightarrow X + X$

$b^*1 \rightarrow b$

$b+0 \rightarrow b$

$b^{**}2 \rightarrow b*b$

## Problem 4

$y = x;$

$x = x + z;$

$y = m^*1;$

$p = y^*2;$

## Problem 5

$[(i-2)*NCOLS + (j-3)]^*4 = 4((i-2)^*8 + (j-3))$

## Problem 6

1, 2, 5, 6, 7, 9, 11

### Problem 7

Part A : top down, bottom up

Part B : bottom up

### Problem 8

CFGs are a notation for specifying CFLs. Parser is a program to recognize whether a string is in a particular CFL.

(Optional : Parsers for a CFL can be automatically generated from the CFG for the CFL (if the grammar is LALR) )

### Problem 9

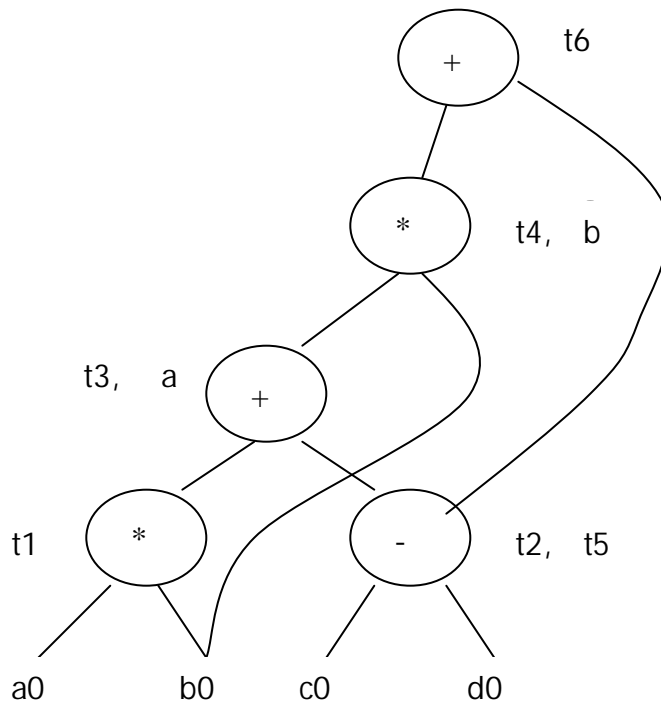
Part A : 2, 8

Part B : 2

### Problem 10

(Typo: Last line of basic block reads:  $b = t_6$ ; )

Part A





## Part B

[Note: There is more than one correct solution]

LetExpr -> let Rest

```
    {LetExpr.tree = Rest.tree;}
```

Rest -> IDExpr , Rest

```
    {Rest.tree = makeLet(IDExpr.tree,Rest.tree);}
```

```
    | IDExpr in Expr end
```

```
    {Rest.tree = makeLet(IDExpr.tree,Expr.tree);}
```

IDExpr -> id : type

```
    {IDExpr.tree = makeIdDecl(id.value,type.value);}
```