

# CS 480/580 Midterm 1

## Winter 2000

The exam has 100 points total, 20 points for each of the five questions. (120 points for 580 students). Closed book, closed notes, closed neighbors.

**Name:**

1. Here is just a portion of the grammar for our programming language

```
varDcl ::= var nameDcl
nameDcl ::= id : type
type ::= id | ^ type
```

Draw a parse tree for the input  
var x : ^ int

2. Draw the DFA that would be constructed by the LR parsing algorithm for this grammar. Number your states.

3. Show the sequence of shift and reduce steps that would occur when processing the input described in question 1.

4. Imagine that a is an array with index values 2 to 5 of integers. The elements of A begin at offset -80 in the activation record. variable i is an integer at offset -8. Draw the AST that would be created for the expression  
3.2 \* a[i]

5. Explain why you would probably not want the following three productions in your grammar, no matter what parsing technique you were using:

```
type ::= id | ^ type | type [ integer ]
```

6. (580 only) Explain the purpose of a virtual method table in implementing object-oriented languages, and how they are used.