1 Instructions

1. The quiz is to be turned in by 12:00 noon.
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. Type-Checking:
   Consider the following ML function definition:

   ```ml
   > fun thrice f x = f(f(f(x))); 
   ```

   Use the Hindley-Milner type-checking algorithm (or any logical procedure) to deduce the type of `thrice()`. You are required to determine the most general type.

2. Expressions and Statements:
   (i) Explain the difference(s) between the `if`-expression and `if`-statement in C.
   (ii) Given the semantics of the assignment statement in C, will the following fragment of code work? Can it be made to work? Justify your answer.

   ```c
   (a > b)? (a=3): (b=4); 
   ```

3. Procedures and Environments:
   Consider the following C program:

   ```c
   int i;
   int b[5];
   
   void q (int x)
   {
     i++;
     x++;
   }
   ```
main()
{
    i=1;
    b[1]=3;
    b[2]=4;
    q(b[i]);
    printf("%d \n",b[i]);
}

What value will be printed assuming that C uses the following parameter passing mechanisms: (i) Pass by value, (ii) Pass by value-result, (iii) Pass by name.

4. **Scheme programming:** Write a function in SCHEME that takes as input two sorted integer lists $L$ and $M$ and returns a list obtained by merging $L$ and $M$. You may assume that the lists are sorted in ascending order.

5. **ML programming:**
   
   (i) Describe how you would declare a type for Binary Search Trees on integers in ML.
   
   (ii) Write a function named **PRE-TRAVVERSE()**, which takes as input a Binary Search Tree of the form described above and outputs the list of elements obtained by a *pre-order* traversal of this tree.