Name_____ NetID _____

CS 314 Practice Exam 1

0. For each of the following pairs of prolog fact and goal, say whether they match (i.e. unify), and if so what bindings will be made.

	fact	goal	
A.	tv(sony).	tv(Sony).	_____
B.	tv(Sony).	tv(Tv).	_____
C.	bro(Bro, Bro).	bro(bob, X).	_____
D.	eats(Cat, fish).	feeds(joe, X).	_____
E.	last(a, [b, c]).	last(X, [X | T]).	_____

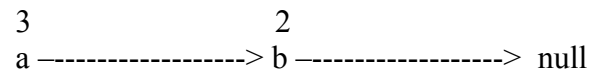
The following applies to problems 1 through 4

- You only need to worry about the first answer prolog will return, not about what will happen if the user types a **;**
- Each of these questions have answers that take at most 3 clauses. However, you may use as many clauses as you wish.
- You may define helper predicates if you wish.
- Your answers may use any built in prolog predicate, including
  - **member**(Elt, List), which is true if Elt is a member of List.
  - **append**(L1, L2, Lappended) which is true if appending L1 to L2 results in Lappended.

1. Define the predicate msaller_of(N1, N2, L). N1, N2, and L are numbers. If N1 is smaller than or equal to N2, L is N1, otherwise L is N2. E.g, smaller_of(4, 5, L) binds L to 4.

2. Define the predicate square_all(Numbers, Results) which multiples each member of Numbers by itself, and binds Results to a list of the results. E.g., square_all([8, 2], L) binds L to [64, 4].

3. Suppose you represent a linked list as a functor wtih two arguments: the data at that node, and the next node the current node points to, with a 'null' node being an empty list. The list drawn below:



... would be represented as:

node(3, node(2, [])).

The prolog predicate listSum(LinkedList, Sum) binds Sum to be the arithmetic sum of all values in the linked list LinkedList, for example:

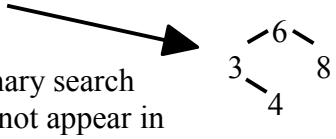
listSum(node(3, node(2, [])), Sum),

... would bind Sum to 5.

Define the rule listSum.

4. Suppose we represent a binary search tree using a Prolog list with three elements: the node data, the left subtree and the right subtree. An empty tree is represented by null.

So: [6, [3, null, [4, null, null]], [8, null, null]] represents this tree



Write the predicate bstNotFound(BST, Value), where BST is a binary search tree as defined above, and Value is a number, which is true if Value does not appear in BST. For example, if 'BST' is bound to the list above; bstNotMember(BST, 10) is true (“yes”) and bstNotMember(BST, 8) is false (“no”). Make sure to exploit the implicit ordering of data values as you scan the binary search tree.