csc324 Solutions to Quiz #5 Tuesday 21 March 2000

1. The predicate `sumto(N, Sum)` doesn't meet its specifications. It should succeed iff `N` has been instantiated to an integer, and `Sum` is the sum of the first `N` integers, (i.e., Sum $= \Sigma_{i=0}^{n} i$).

```
sumto(0, 0).

sumto(N, S+N) :- sumto(N-1, S).
```

Fix the code by making changes directly on it. For full marks, make sure that the predicate works properly if ";" is used to look for all possible answers.

```
; We need to use "is" every time we want an arithmetic expression evaluated.
; And we need a cut to avoid backtracking and using the second rule in an
; attempt to satisfy the goal sumto(0, X).  Try tracing it!
sumto(0, 0) :- !.
sumto(N, S) :- Oneless is N-1,
               sumto(Oneless, Subtotal),
               S is Subtotal + N.
```

2. Here is a Prolog predicate:

```
p(X, Y) :- not a(X), b(X,Y).
```

Recall that there are rules one should follow for the safe use of "not". Does this predicate use "not" safely? Circle yes or no, and then complete the sentence.

Yes, it is safe as it is, because:

$\boxed{\text{No}}$, it needs this precondition to be safe: `X should be fully instantiated when p(X,Y) is called.`

3. Consider the following Prolog code.

```
yummy(icecream).
yummy(chocolate).
healthy(X) :- not yummy(X).
```

What is the first answer Prolog would give to the query `healthy(chocolate).` `no`
What is the first answer Prolog would give to the query `healthy(fruit).` `yes`
What is the first answer Prolog would give to the query `healthy(X).` `no`

4. Consider the following Prolog code.

```
professor(rich).
professor(jan).
judge(david).
curator(jane).
city(jan, lascruces).
city(rich, toronto).
city(jane, forterie).
city(david, toronto).
```

What is the first answer Prolog would give to the query `city(professor(X), toronto).` `no`
What is the first answer Prolog would give to the query `city(X, city(david, X)).` `no`