

CMSC 330 Quiz #5

Name

UID

Discussion Section:
Richard

9am Vicky

10am Vicky

11am Richard

12pm

9am Varun

10am Varun

11am Tammy

12pm Tammy

Instructions

- Do not start this test until you are told to do so!
- You have 20 minutes for this quiz.
- This is a closed book quiz. No notes or other aids are allowed.
- For partial credit, show all of your work and clearly indicate your answers.
- Write neatly. Credit cannot be given for illegible answers.
- This quiz is for 21 points.

1. (7 points) Given the following facts and rules, write the output(s) for the queries. If there are multiple outputs, write all outputs. You will not get full credit if you list an incorrect output along with a correct output.

```
is_friends_with(alice, bob).  
is_friends_with(bob, alice).  
is_friends_with(bob, charlie).  
is_friends_with(dennis, eve).  
is_friends_with(dennis, alice).  
is_friends_with(bob, frank).
```

```
foo(X, Y) :-  
    is_friends_with(X, Z),  
    is_friends_with(Z, Y),  
    not(X = Y).
```

a. (1 point) `is_friends_with(bob, X).`
`X = alice. X=charlie. X = frank.`

b. (2 points) `foo(X, bob).`
`X = dennis.`

c. (2 points) `foo(X, eve).`
`false.`

d. (2 points) `foo(alice, Y).`
`Y = charlie. Y = frank.`

2. (7 points) Write the predicate **reverse**(*L*,*A*,*R*) where *L* is a list, *A* is an intermediate accumulator used for reversing and *R* yields the reverse list. The base case has been provided.

Here is a query example of how it could be used:

```
?- reverse([1,2,3], [], R).
```

```
R = [3,2,1]
```

```
reverse([],X,X).
```

```
reverse([X|Y],A,R) :- reverse(Y,[X|A],R).
```

3. (7 points) Write the predicate **fibonacci**(*V*,*N*) that finds the value $V = F_N$ which is the N^{th} value in the Fibonacci sequence where the recurrence relationship is given by,

$$F_0 = 0, F_1 = 1$$
$$F_N = F_{N-1} + F_{N-2}$$

Some example queries would be,

```
?- fibonacci(V,7).
```

```
V = 13
```

```
?- fibonacci(V,2).
```

```
V = 1
```

```
fibonacci(0,0).
```

```
fibonacci(1,1).
```

```
fibonacci(V,N):-
```

```
    N1 is N-1,
```

```
    N2 is N-2,
```

```
    fibonacci(V1,N1),
```

```
    fibonacci(V2,N2),
```

```
    V is V1 + V2.
```