

CMSC330 Spring 2014 Quiz #3

Name _____

Discussion Time	10am	11am	noon	1pm	2pm
TA Name (circle):	Tammy	Tammy Ilse	Tammy Casey	Daniel Ian	Daniel

Instructions

- You have 20 minutes for this quiz.
- This is a closed book exam. 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.

1. (12 pts) Prolog

Given the following clauses, list all answers returned by the following queries.

avenger(thor). avenger(captainAmerica). sibling(thor,loki). asgardian(thor). asgardian(X) :- sibling(Y,X),asgardian(Y). train1(X,Y) :- avenger(X),!,avenger(Y). train2(X,Y) :- avenger(X),X\=Y,avenger(Y). a. (1 pt) ?- avenger(captainAmerica). b. (1 pt) ?- asgardian(A). c. (1 pt) ?- train1(A,B). d. (1 pt) ?- train2(A, captainAmerica). e. (2 pt) ?- train2(captainAmerica,A).	foo([_ T],R) :- foo(T,R). foo([H1,H2 T],H1) :- H1 = H2. f. (2 pt) ?- foo([1,2,3],A). g. (2 pts) ?- foo([2,2,4],A). h. (2 pts) ?- foo([5,2,2,3,4,4],A)
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2. (8 pts) Multithreading

<pre>class Buffer { Buffer () { Object buf = null; boolean empty = true; } }</pre>	<pre>void produce(o) { synchronized (this) { 1. if (!empty) wait(); 2. empty = false; 3. notifyAll(); 4. buf = o; } }</pre>	<pre>Object consume() { synchronized (this) { 5. if (empty) wait(); 6. empty = true; 7. notifyAll(); 8. return buf; } }</pre>
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Consider the preceding multithreaded Java 1.4 code. Assume there are multiple producer and consumer threads being executed in the program, but only a *single* Buffer object. Questions about the “last statement executed” by two threads x & y refer to the most recently executed statement by those threads at some arbitrary time during the program execution. It does not mean the last statement executed by a thread before the thread exits. If a situation is possible, you need to give an example of how it is possible (e.g., thread x gets to statement a, then thread y gets to statement b). If a situation is not possible, you need to explain why.

- a. (2 pts) Is it possible given two threads x and y for the last statement executed by thread x to be statement 2 and thread y to be statement 7 in the code above? Explain your answer.

- b. (3 pts) Is it possible given two threads x and y for the last statement executed by thread x to be statement 3 and thread y to be statement 5 in the code above? Explain your answer.

- c. (3 pts) Is it possible in the code above for two threads calling consume() to get the same value from the Buffer object? Explain your answer.