

CMSC330 Fall 2013 Quiz #4

Name _____

Discussion Time	9am	10am	11am	Noon	1pm
TA Name (circle):	Ilse	Daniel	Casey	Yoav	Ilse
	Richard	Richard	Richard		

Instructions

- **Do not start this test until you are told to do so!**
- You have 15 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. (8 pts) Prolog

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

hobbit(frodo). hobbit(samwise). human(aragorn). human(gandolf). taller(gandolf,aragorn). taller(X,Y) :- human(X),hobbit(Y).	foo([],X,[X]). foo([H T],X,[H R]) :- foo(T,X,R).
a. (2 pts) ?- human(Z).	c. (2 pts) ?- foo([],2,Z).
b. (2 pts) ?- taller(gandolf,Z).	d. (2 pts) ?- foo([a,b,c],d,Z)

2. (12 pts) Multithreading

Consider the following multithreaded Ruby code. Assume there are multiple threads being executed in the program, but just a *single* Market object. If we freeze program execution at some point in time, each thread T will have just finished executing some statement S (i.e., statement S will have been the last statement executed by thread T). We wish to examine the state of these threads.

<pre>class Market def initialize @count = 0 @myL = Monitor.new @myC = @myL.new_cond end</pre>	<pre>def produce @myL.synchronize { 1. @myC.wait_while(@count > 9) 2. @count += 1 3. @myC.broadcast } end</pre>	<pre>def acquire @myL.synchronize { 4. @myC.wait_while(@count < 2) 5. @count = @count - 2 6. @myC.broadcast } end</pre>
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- (3 pts) Is it possible given two threads x and y for the last statement executed by both threads to be statement 4 in the code above? Explain your answer.
- (3 pts) Is it possible given two threads x and y for the last statement executed by thread x to be statement 4, and the last statement executed by thread y to be statement 2? Explain your answer.
- (3 pts) Is it possible given two threads x and y for the last statement executed by thread x to be statement 5, and the last statement executed by thread y to be statement 2? Explain your answer.
- (3 pts) Is it possible to modify the code above to reduce how often threads are woken up, but must go right back to sleep because there is no work to perform? Explain your answer.