CSci 402 - Operating Systems

Quiz 2

Fall 2023

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(This exam is open book and open notes.
Remember what you have promised when you signed your
Academic Integrity Honor Code Pledge.)

Time: (N/A) minutes

_____-
Name (please print)

Total: 10 points

_____-
Signature

Instructions

1. This is the first page of your exam. The previous page is a title page and does not have a page number. Since this is a take-home exam, no need to sign above since you won't submit this file.
2. Read problem descriptions carefully. You may not receive any credit if you answer the wrong question. Furthermore, if a problem says *"in N words or less"*, use that as a hint that N words or less are expected in the answer (your answer can be longer if you want). Please note that points may get *deducted* if you put in wrong stuff in your answer.
3. If a question doesn't say `weenix`, please do not give `weenix`-specific answers.
4. Write answers to all problems in the **answers text file**.
5. For non-multiple-choice and non-fill-in-the blank questions, please show all work (if applicable and appropriate). If you cannot finish a problem, your written work may help us to give you partial credit. We may not give full credit for answers only (i.e., for answers that do not show any work). Grading can only be based on what you wrote and cannot be based on what's on your mind when you wrote your answers.
6. Please do *not* just draw pictures to answer questions (unless you are specifically asked to draw pictures). Pictures will not be considered for grading unless they are clearly explained with words, equations, and/or formulas. It's very difficult to draw pictures in a text file and you are not permitted to submit additional files other than the answers text file.
7. For problems that have multiple parts, please clearly *label* which part you are providing answers for.
8. Please ignore minor spelling and grammatical errors. They do not make an answer invalid or incorrect.
9. During the exam, please only ask questions to *clarify* problems. Questions such as "would it be okay if I answer it this way" will not be answered (unless it can be answered to the whole class). Also, you are suppose to know the definitions and abbreviations/acronyms of *all technical terms*. We cannot "clarify" them for you. We also will **not** answer any clarification-type question for multiple choice problems since that would often give answers away.
10. Unless otherwise specified and stated explicitly, multiple choice questions have one or more correct answers. You will get points for selecting correct ones and you will lose points for selecting wrong ones.
11. When we grade your exam, we must assume that you wrote what you meant and you meant what you wrote. So, please write your answers accordingly.

(Q1) (2 points) Which of the following statements are correct about **pthread**?

(1) pthread_wait() is a blocking call
(2) if a thread calls pthread_exit(ret_value), since ret_value is of type (void*), you must never call pthread_exit(NULL) or you will get a segmentation fault for dereferencing a NULL pointer
(3) if pthread_create() succeeds, the address space of the process before pthread_create() is called and after pthread_create() has returned are identical
(4) when a thread returns from its "first procedure", it will have to call the exit() system call
(5) none of the above is a correct answer

Answer (just give numbers): _____

(Q2) (2 points) Which of the following are pthread library functions that are **not** used for **thread synchronization**?

(1) pthread_create()
(2) pthread_mutex_unlock()
(3) pthread_exit()
(4) pthread_cond_wait()
(5) pthread_cond_signal()

Answer (just give numbers): _____

(Q3) (2 points) Which of the following statements are correct about what would happen if thread X calls **pthread_cond_wait(cv,m)**?

(1) thread X would atomically unlock **cv** and go to sleep in **m's** queue
(2) thread X must not be the owner of mutex **m** when it calls pthread_cond_wait(cv,m) or deadlock would occur
(3) when thread X returns from pthread_cond_wait(), the pthread library guarantees that thread X is the owner of mutex **m**
(4) when another thread calls pthread_cond_signal(cv), thread X will immediately return from pthread_cond_wait(cv,m)
(5) none of the above is a correct answer

Answer (just give numbers): _____

(Q4) (2 points) Which of the following statements are correct about **semaphores**?

(1) if S is a semaphore, then P(S) is how one can atomically increment S
(2) if S is a semaphore, then V(S) is how one can atomically decrement S
(3) if S is a semaphore, then the "guard" in the guarded command that implement P(S) is "empty"
(4) if S is a semaphore, then the "guard "in the guarded command that implement V(S) is "empty"
(5) none of the above is a correct answer

Answer (just give numbers): _____

(Q5) (2 points) Which of the following statements are correct about **warmup2 threads**?

(1) the token thread can never sleep in a mutex queue
(2) the packet thread sometimes has to sleep in a mutex queue
(3) a packet can only be moved from Q1 to Q2 by the packet thread (and can never be moved by the token thread)
(4) the server threads are the only threads that should never sleep in a CV queue
(5) none of the above is a correct answer

Answer (just give numbers): _____