CSci 402 - Operating Systems

Quiz 2

Summer 2025

Friday, Jun 6

Instructor: Bill Cheng

Teaching Assistant: (N/A)

(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 **signals**?

(1) if you are running "warmup2" in your command shell and if you press <Ctrl+c> on your keyboard, the kernel will generate a SIGTSTP signal
(2) when a signal is generated in the kernel and if the user space program is blocking it, it will be delivered immediately
(3) when a signal is generated by a user space program and if the kernel is blocking it, it becomes pending
(4) when your user space program executes a divide-by-zero instruction, it will trap into the kernel and the kernel will generate a SIGSEGV signal
(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 used for **thread synchronization**?

(1) pthread_create()
(2) pthread_mutex_lock()
(3) pthread_cond_broadcast()
(4) pthread_exit()
(5) pthread_kill()

Answer (just give numbers): _____

(Q3) (2 points) Which of the following statements are correct about **warmup2 threads**?

(1) the token thread sometimes has to sleep in the mutex queue
(2) when a server thread becomes free and Q2 is empty, the server thread must go to sleep in the CV queue
(3) a packet can only be moved from Q1 to Q2 by the token thread (and can never be moved that way by the packet thread)
(4) the packet thread should never sleep in the mutex queue
(5) none of the above is a correct answer

Answer (just give numbers): _____

(Q4) (2 points) What pthread-related functions were **not** discussed in some details in lectures that covered Ch 2?

(1) pthread_mutex_unlock()
(2) pthread_join()
(3) pthread_cond_signal()
(4) pthread_self()
(5) pthread_equal()

Answer (just give numbers): _____

(Q5) (2 points) Which of the following statements are correct about what would happen if thread X calls **pthread_cond_wait(cv,m)** (assuming that everything is done correctly)?

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

Answer (just give numbers): _____