CSE 3100 Systems Programming	Out: 12/5/17
Extra Credit (100%) Assignment #9	Due: 12/10/17

In the *unisex bathroom problem* a number of co-workers must share a single bathroom. The `unisex.c` program uses a mutex and a condition variable to solve the problem under the constraint that women and men cannot use the bathroom at the same time. Specifically, the program takes two optional command line parameters (the number of females and males, respectively), then creates a thread for each person and simulates bathroom use under some highly contentious conditions... For the complete command line options build the executables using `make` and run

```
% ./unisex -h
```

Exercise 1. ***(20 points)*** *The code in* `unisex.c` *ensures that females and males do not enter the bathroom at the same time but does not restrict the number of people in the bathroom.* `unisex1.c` *is a copy of* `unisex.c` *with logic added to take an extra command line parameter specifying the number of bathroom stalls* s*.* ***Complete the code to enforce the additional constraint that no more than*** s ***women or men can be in the bathroom at any given time.***

Exercise 2. ***(30 points)*** *Further modify the code to give priority to women. If there are any men in the restroom and a woman wants to use it, no more men must be allowed to enter, and when the last man leaves the restroom the waiting women must be allowed to enter in arbitrary order. Men must only be allowed to enter the restroom when no women are waiting. As in Exercise 1, no more than* s *people must be allowed in the bathroom at any given time.* ***Submit the code as*** `unisex2.c`.

Exercise 3. ***(50 points)*** *A serious problem with the original code and its modification in Exercise 2 is that some people may never get to use the bathroom if members of the opposite sex keep it occupied indefinitely. A fair solution is obtained by enforcing the following rules:*

- *If women are in the bathroom and at least one man is waiting outside, no other women are allowed to enter before men get their turn. When the last woman exits, up to* s *waiting men (arbitrarily picked) are allowed to enter the bathroom.*
- *Similarly, if men are in the bathroom and at least one woman is waiting, no other men are allowed to enter and, when the last man exits, up to* s *waiting women are allowed in the bathroom.*

Implement this solution in `unisex3.c`.