

## Problem Set 5

Due Sunday March 12, 11:59pm

1. Add a user-level co-routine package to xv6. Co-routines are non-preemptive threads – that is, threads that only switch when they call yield or block. We will provide some framework code for you to work with.
2. Use the upcall mechanism from problem set 1 to implement preemptive user-level threads – the timer alerts the user-level thread system to switch threads. Hint: you will need to change the semantics of the timer system call to provide access to the (interrupted) user level context.
3. Implement lazy asynchronous system calls (aka scheduler activations). Kernel operation is normal as long as the system call does not block waiting for an event (such as a disk operation to complete). If the system call does block, it blocks AND does an upcall to allow the user code to continue executing a different user level thread. When the system call completes, it does another upcall to alert the user level code, which can then choose whether to switch to the thread waiting for the system call to complete.