Concurrency exercises  
  
  
Creating and joining threads  
  
1.a. Write a short program that prints "Hello world" from an additional  
 thread using the Java Thread API.  
  
1.b. Now modify the program to print "Hello world" five times, once from each  
 of five different threads. Ensure that the strings are not interleaved  
 in the output.  
  
1.c. Now modify the printed string to include the thread number; ensure that  
 all threads have a unique thread number.  
  
  
Simple synchronisation  
  
2.a. Write a short program in which two threads both increment a shared  
 integer repeatedly, without proper synchronisation, 1,000,000 times,  
 printing the resulting value at the end of the program. Run the program  
 on a multicore system and attempt to exercise the potential race in the  
 program.  
  
2.b. Now modify the program to use "synchronized" to ensure that increments  
 on the shared variable are atomic.  
  
  
Guarded blocks  
  
3.a. Write a short program in which one thread increments an integer  
 1,000,000 times, and a second thread prints the integer -- without  
 waiting for it to finish.  
  
3.b. Now modify the program to use a condition variable to signal completion  
 of the addition task by the first thread before the second thread prints  
 the value.