

Name: _____

Directions: **Work only on this sheet** (on both sides, if needed); do not turn in any supplementary sheets of paper. There is actually plenty of room for your answers, as long as you organize yourself BEFORE starting writing.

1. This problem concerns the Pthreads code for counting prime numbers, in pages 6ff.

(a) (20) Fill in the blanks: There is a critical section in lines _____ through _____

(b) (20) Fill in the blanks: If n is 100, then the amount of work printed out for a thread could range from _____ to _____

2. (20) Suppose a program that uses the shared-memory paradigm includes the code (given here in pseudocode)

```
if my_thread_number == 0
  for i = 0 to number_ofthreads
    x[i] = i * i
for i = 0 to number_ofthreads
  z[i] = x[i] - y[i]
next_line:
```

Fill in the blank with a term from our course: In the line labeled **next_line**, we need a _____.

3. This problem concerns the MPI code for counting primes. in pages 11ff.

(a) (20) When the number 25 is checked for primeness, how many times is it sent from one node to another?

(b) (20) Suppose that instead of the three-node setting here, we were to rewrite the code for four nodes. There now would be a function **Node3()** that would look very similar to the old function **Node2()**. Referring to specific line numbers, state the differences (old line contents versus new ones) between the old **Node2()** and the new **Node3()**.

Solutions:

1a 48, 49

1b 0, 3

2 barrier

3a 1

3b in line 134, $3 \rightarrow 4$ and in line 141, $7 \rightarrow 11$