

CSE 340 Final

Olcay Taner YILDIZ

I. QUESTION (15 POINTS)

Write a parallel function to find the number of integer solutions to the equation

$$a^3 + b^3 = c^3 \quad (1)$$

where $1 < a, b, c < 1000$.

II. QUESTION (15 POINTS)

Solve the same problem in Question 1 using manager and worker paradigm.

III. QUESTION (15 POINTS)

Benchmarking a parallel program on 1, 2, ..., 8 processors produces the following speedup results:

p	ψ
2	1.89
3	2.68
4	3.39
5	4.03
6	4.62
7	5.15
8	5.63

What is the primary reason for the parallel program achieving a speedup of only 5.63 on eight processors?

IV. QUESTION (15 POINTS)

Write a parallel function

```
void decreasing_order(int* local, int p, int id)
```

which checks if the numbers in overall array are in decreasing order or not. Processor 0 will print the result. Assume that all processors have n/p elements of the array with name *local*.

V. QUESTION (20 POINTS)

Write a parallel function that finds the mod (the maximum occurring number) of an integer array containing only numbers between 1 and 10. Assume that all processors have n/p elements of the array with name *local*.

```
void modArray(int* local, int N, int p, int id)
```

VI. QUESTION (20 POINTS)

Write the function *distribute* which reads p integers for all processors. Afterwards, each processor send 1 integer to each processor. At the end, each processor will again have p elements.