COMP 428: Parallel Programming
Winter 2012 Assignment 1

Grégoire Morpain - #6398391
gregoire.morpain@gmail.com

Q.1.

a) Cf. Source Code

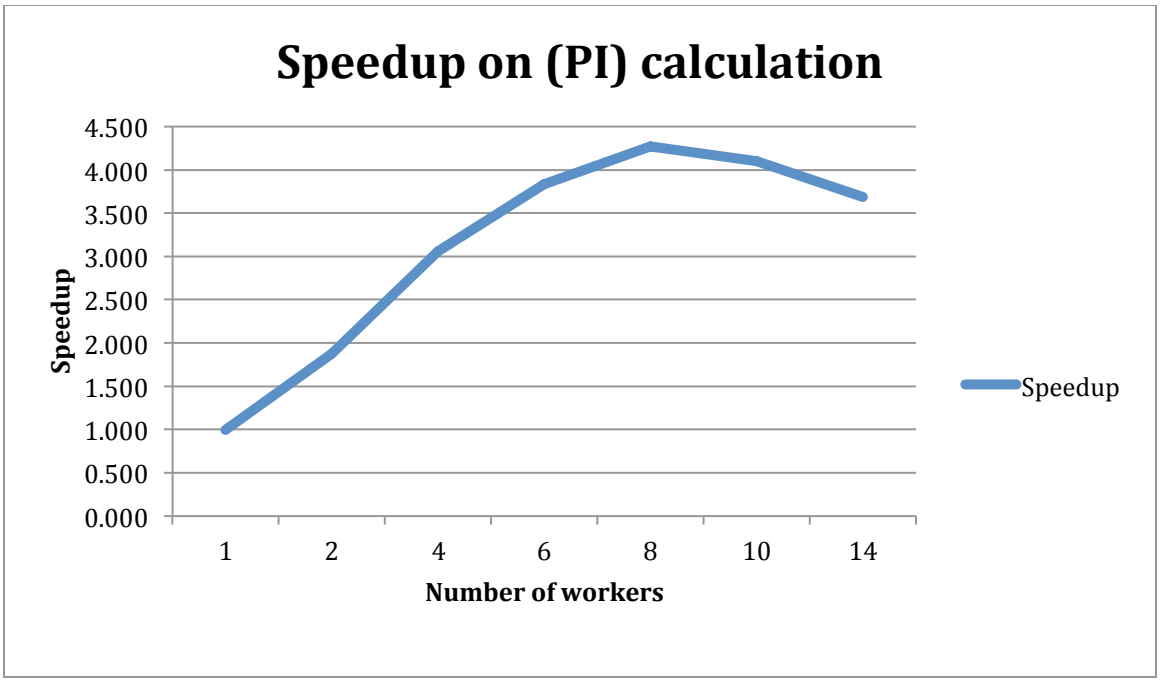
b) All tests have been realized with 5000000Darts on 1000Rounds.

2 workers ~> 28.767s
4 workers ~> 17.618s
6 workers ~> 14.066s
8 workers ~> 12.607s
10 workers ~> 13.145s
14 workers ~> 14.611s

NB. Tests realized on an 8-cores processor.

c) The code is not 100% implemented therefore I have no relevant data for this experiment.

d)



The speedup decreases if we our number of workers is superior to our processor's real number of cores.

Q.2.

Master pseudo-code

```
create X workers
send a task to each workers

while workToDo {
  receive result from worker
  schedule next task
  send task to the worker
}
```

```
while workToDo {
  receive task from master
  execute task
  send result to master
}
```

Worker main loop pseudo-code

Q.3.

a) Yes it is close to possible, for example if we apply a divide-and-conquer parallelization strategy to a merge sort, the number of comparisons is close to theoretical minimum for comparison-based sorting:

$$\log n! \approx n \lg n - 1.44 n$$

b) This statement is false. With fine-grained granularity the data is transferred among processors frequently in amount of few memory words; the finer the granularity, the greater the potential of speed-up, but it increases the overheads of synchronization.
To get the best parallel performance, you have to find the right amount of granularity; otherwise you can suffer from increased communication overhead or on the other side from load imbalance.

Q.4.