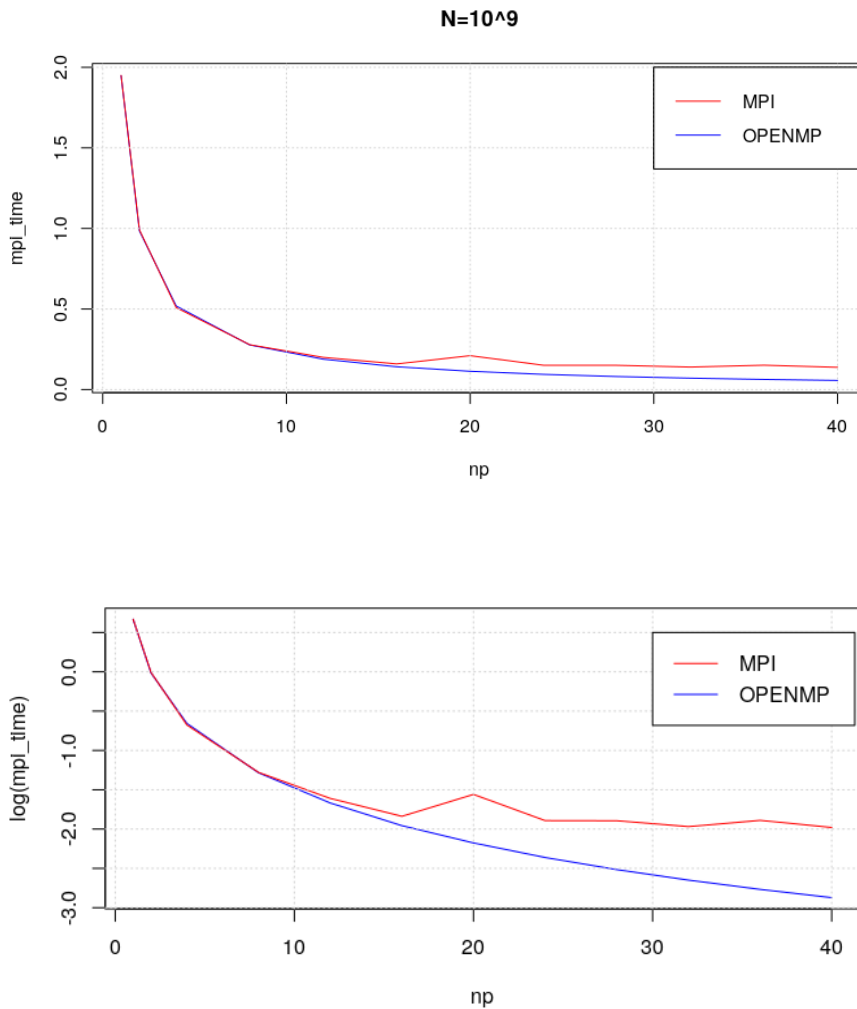# ex3

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## Approximate $\pi$

The following plots show how much the time decrease as we increase the number of processes, both for the MPI and OMP version of the program.





We can see that at a certain point the openmp program outperforms the mpi one, this happens because the mpi program spends more time in communications (after the 20th proc when it has to communicate with another node); anyway, this should have an impact on performance just when the time spent in calculation is paragonable with the time spent in communication , and in this case (embarassingly parallel application) this is not an issue.