# Exercise 4 - Theory Answers

1. **Why is there no need for a border exchange when using Pthreads?**

In Pthreads, all threads share the same memory space so, since each thread can directly access the grid, there's no need to exchange boundary data between them.

2. **What is the difference between OpenMP and MPI?**

OpenMP is used for shared memory systems, where threads share the same resources and work concurrently on the same data. MPI is for distributed memory systems, where each process has its own memory and works independently.

3. **Comment on the difference between Pthreads and the two OpenMP implementations.**

Pthreads require manual thread management and synchronization, offering better control but more complexity. OpenMP abstracts thread management through *pragmas*, so it's more "programmer" friendly.

4. **How would you parallelize a recursion problem with OpenMP?**

To parallelize a recursion problem in OpenMP, you can use the *#pragma omp parallel* directive to create threads and *#pragma omp single* to ensure one thread initiates the recursive function, as exemplified in slide 16 of lecture 18.