Exercise 2 - Theory Answers

1. **What speed-up/expected speed-up did you get by parallelising the code?**

The executions times in my environment we're the following:

- Sequential version: 6.346258 seconds
- Parallel version (1 process): 6.844592 seconds
- Parallel version (4 processes): 2.204194 seconds
- Parallel version (13 processes): 49.268798 seconds

The speed-up is calculated as: (Sequential time) / (Parallel time)

For 4 processes: 6.346258 / 2.204194 ≈ 2.88x speed-up

This is a good speed-up considering the conditions. The single-process parallel version is slightly slower due to MPI overhead. The 13-process version actually slows down significantly, likely due to communication overhead.

2. **What is the name for this type of parallelisation (splitting the domain between processes and using ghost cells to communicate)?**

This type of parallelisation is called "Domain Decomposition" as shown in the recitation lecture about this assignment.

3. **What is the difference between point-to-point communication and collective communication?**

While point-to-point communication involves data exchange between two specific processes. (e.g. MPI_Send and MPI_Recv),

collective communication involves all processes (e.g. MPI_Broadcast, MPI_Reduce, and MPI_Gather).

4. Given the following code: int* a, b; Which type is b?

In this declaration, ‘b’ is of type int. The * only applies to ‘a’, making ‘a’ a pointer to an integer.