Exercise 1

Von Neumann's model is the foundation of today's modern computer architecture. It is divided into 4 subsystems:

- **Arithmetic logic unit (ALU):** Performs arithmetic and logic operations on data.
- **Memory:** Stores both data and instructions required for the CPU to process.
- **Control Unit:** Directs the operation of other subsystems such as ALU, memory, and output/input, fetches instructions from memory, decodes, and executes them.
- **Input/Output (I/O):** Facilitates communication between the computer and the outside world, allowing users to input data and receive output.

Exercise 2

Generation	Time Period	Main Technology	Characteristics
1st	1945 – 1956	Vacuum Tubes	Large, expensive, unreliable, used machine language
2nd	1959 – 1965	Transistors	Smaller, faster, more reliable, used assembly language
3rd	1965 – 1975	Integrated Circuits (ICs)	Minicomputers, batch processing, multi-programming
4th	1975 – 1985	Microprocessors	Personal computers, GUI, networking, floppy disks
5th	1985 – Present	VLSI Microprocessors	Laptops, smartphones, the Internet, AI, IoT

Exercise 3

Computer subsystems and their roles:

CPU (Central Processing Unit): Executes instructions, performs calculations, and manages data movement.

Memory: Stores data and instructions for the CPU to access during processing.

ALU (Arithmetic Logic Unit): Performs arithmetic and logic operations on data received from memory.

Control Unit: Manages the data flow between the CPU, memory, and other devices, and controls the execution of instructions.

Input/Output: Facilitates communication between the computer and external devices such as keyboard, mouse, monitor, and printer.

Cache memory: High-speed memory located between the CPU and main memory, used to store frequently accessed data for faster retrieval.