NUMBER 1: REGISTERS

1. AX – AHL – AL –

* generally used for arithmetical and logical instructions

1. BX – BH – BL

* base register, it is used to store the value (can store data but mostly address)

1. CX – CH – CL

* Counter register, generally used for loop instructions

1. DX – DH – DL

* Generally used in divide and multiplication

1. SP (Stack Pointer) – generally used to stack data,
2. BP (Base Point) – generally used in accessing parameters passed by the stack
3. SI (Source Index) - used in the pointer addressing of data and as a source in some string-related operations.
4. DI (Destination Index) - used in the pointer addressing of data and as a destination in some string-related operations.

SEGMENT POINTERS

1. ES – (extra segment) it's up to a coder to define its usage.
2. CS - containing the current program.
3. SS - containing the stack.
4. DS - where variables are defined.

SPECIAL REGISTERS

1. IP (Instruction Pointer) – generally used to points to next instruction to be executed (IP always works together with CS and it points to currently executing instruction).

NUMBER 2: FLAGS IS A SPECIAL PURPOSE REGISTERS

FLAG REGISTERS - determines the current state of the processor. this allows to determine the type of the result, and to determine conditions to transfer control to other parts of the program.

* Carry Flag (CF) - this flag is set to 1 when there is an unsigned overflow. For example, when overflow, bytes 255 + 1 (result is not in range 0...255). When there is no overflow, this flag is set to 0. (used to indicate when an [arithmetic](https://en.wikipedia.org/wiki/Arithmetic) [carry](https://en.wikipedia.org/wiki/Carry_(arithmetic)) or borrow has been generated out of the [most significant](https://en.wikipedia.org/wiki/Most_significant_bit) [arithmetic logic unit](https://en.wikipedia.org/wiki/Arithmetic_logic_unit) (ALU) bit position).
* Parity Flag (PF) - this flag is set to 1 when there is even number of one bit in (the low 8 bits of a) result, and to 0 when there is odd number of one bit. (used to indicates if the numbers of set bits [is odd or even](https://en.wikipedia.org/wiki/Parity_(mathematics)) in the binary representation of the result of the last operation).
* Auxiliary Flag (AF) - set to 1 when there is an unsigned overflow (carry-out) for low nibble (4 bits). (used in BCD (Binary-coded Decimal) operations).
* Zero Flag (ZF) - set to 1 when result is zero. For non-zero result this flag is set to 0. (Used to check the result of an arithmetic operation, including bitwise logical instructions.)
* Sign Flag (SF) - set to 1 when result is negative. When result is positive it is set to 0. (This flag takes the value of the most significant bit.) (Used to indicate whether the result of the last mathematical operation produced a value in which the most significant bit (the left most bit) was set.)
* Trap Flag (TF) - Used for on-chip debugging. (used to permits operation of a processor in single-step mode. If such a flag is available, debuggers can use it to step through the execution of a computer program.)
* Interrupt enable Flag (IF) - when this flag is set to 1 CPU reacts to interrupts from external devices. (Used to determines whether or not the (CPU) will respond immediately to maskable hardware interrupts)
* Direction Flag (DF) - this flag is used by some instructions to process arrays. When this flag is set to 0 the processing is done forward, when this flag is set to 1 the processing is done backward. (used by some instructions to process data chains)
* Overflow Flag (OF) - set to 1 when there is a signed overflow. For example, when you add bytes 100 + 50 (result is not in range -128...127). (Used to indicate when an arithmetic overflow has occurred in an operation)