

CP 216 - Assignment - 3 AB

3.2 a) The PC register (Program Counter) is used to store the address of the next instruction to be fetched for execution. After each instruction is fetched, the counter increases by 1.

b) This register holds the address of the memory where the CPU will read or write data.

c) This register holds the address of the data/instructions read from or written in data.

d) This register stores instructions fetched from main memory. The control unit executes it by sending signals to the right components.

$$\begin{array}{r} \text{3.3 a)} \quad \begin{array}{r} 001011 \\ + 001101 \\ \hline 011000 \end{array} \end{array}$$

$$\begin{array}{r} \text{b)} \quad \begin{array}{r} 111111 \\ + 000001 \\ \hline 1000000 \end{array} \end{array}$$

$$\begin{array}{r} \text{c)} \quad \begin{array}{r} 000000 \\ - 111111 \\ \hline 1011111 \end{array} \end{array}$$

$$N=0, Z=0, V=0, C=1$$

$$N=0, Z=0, V=1, C=1$$

$$N=1, Z=0, V=1, C=1$$

$$\begin{array}{r} \text{d)} \quad \begin{array}{r} 101101 \\ + 011011 \\ \hline 1001000 \end{array} \end{array}$$

$$\begin{array}{r} \text{e)} \quad \begin{array}{r} 000000 \\ - 000001 \\ \hline 1000001 \end{array} \end{array}$$

$$\begin{array}{r} \text{f)} \quad \begin{array}{r} 111110 \\ + 111111 \\ \hline 1111101 \end{array} \end{array}$$

$$N=0, Z=0, V=1, C=1$$

$$N=1, Z=0, V=0, C=1$$

$$N=0, Z=0, V=1, C=1$$

3.7 It exposes the pipeline because it displays and stores the program counter. Thus, it stores the instruction to be fetched which includes the fetch, decode and execute instructions (the 3 stages of pipelining).

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3.8 General Purpose Registers can store both data and memory address location whereas separate registers can only hold one of the two. General Purpose can also be used by either programmer or user when separate registers can ~~be~~ only be used by a programmer.