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| 1. | 1. What is pipelining? Is it helpful or not? Discuss according to your answer. 5 |
| 1. Compare between pipeline machine and non-pipeline machine. suppose there are 12 instructions in a program. Draw the page table and compute the following:  * **Total time for pipeline and non-pipeline.** * **Speedup** * **Efficiency or utilization.** |
| 1. Consider a non-pipelined machine with 6 execution stages of lengths 20 ns, 20 ns, 30 ns, 25 ns, 20 ns, and 20 ns.  -  Find the instruction latency on this machine.   -  How much time does it take to execute 80 instructions?  Suppose we introduce pipelining on this machine. Assume that when introducing pipelining.        - What is the instruction latency on the pipelined machine?        - How much time does it take to execute 80 instructions?  Also calculate the speedup. |
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