Hershey problem #1 2007 – 2008

Consider $\dfrac{1}{97}$. 97 is prime and its decimal representation has a 96 digit repetend, starting with the first decimal digit. This means that a block of 96 digits is repeated endlessly. Further we're given that the 96th place has a value of 7, and the 95th place has a value of 6. Compute the 94th place. You are on your honor to not use a calculator or computer program, or other machine aid.

Also, is there any of the given information which is not necessary?

Also, for full Hershey credit, you must explain your chain of reasoning, not just give the correct number.

Also, to get the large Hershey reward that you desire, submit your solution electronically (so I can post on the web). Handwritten solutions, as cool cordless and wireless as they are, only get the small Hershey reward.

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