CSC236, Summer 2005, Assignment 2
second portion of hints

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1. Don't worry if the formula you come up with is recursive — the closed form is reasonably difficult to derive, and I don't require it for this question. To see whether you've got the right formula, the number of distinct outputs starting with a single sequence of length 4 is 14, and the number of distinct outputs starting with a single sequence of length 5 is 42.

2. In Week 5's lecture we discussed some properties that the well-formed arithmetic expressions have that make it impossible for certain classes of strings to be members of that set. Use the same sort of thinking for this question. The first few string in $\mathcal{T}^*$ are 0 (from the base case), and 102, 201, 000 (applying the induction step).

3. Lecture 4 discusses one method of finding the closed form for a recurrence by first solving a related equation, and then using that solution to help solve the recurrence. Earlier in that lecture we discussed binary strings with special restrictions.

4. Later parts of this question may use earlier parts of the same question. If you are unable to solve an earlier part, you are allowed to assume it in the proof of a later part, if that helps. If you are having trouble with the summation ("$\sum$") notation, consider trying substitutions such as $j = k - 1$ to see whether that improves things.