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1. We introduced Linear Bounded Automata in our last homework. In this one prove the following two claims. You will probably need the results from last homework.
  - (a) Argue that the halting problem for deterministic linear bounded automata is decidable. Hint: need to detect whether the machine has gone into a loop.
  - (b) Prove by diagonalization that there exists a recursive set that is not accepted by any LBA.
2. 9.3.7. b,c.
3. Describe the operation of a Turing machine that computes g.c.d. (greatest common divisor) using the following algorithm. You do not have to describe the formal transitions and set of states, but a clear English explanation is required.

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procedure gcd(m,n):  if n=0 then return (m), else return (gcd(n, m mod n)).
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Assume the machine starts with  $\{a^m \# a^n\}$  on the tape, and the tape symbols are  $\{a, \#\}$ .

4. 9.2.6 c,d,f.