Rajat Sethi – CPSC 3500 – Assignment 10

1. All languages recognizable by a DFA are decidable. M is a DFA, therefore S is decidable.
2. Have the grammar brute force as many distinct strings as possible in an algorithm. If the program finds a new string of terminals, increment a counter. If it starts infinite looping, then move onto the next string without incrementing. Once the algorithm reaches 100 strings, halt the algorithm and return true. If the last possible string is created, and the counter is still less than 100, then return false. Either way, the algorithm will always halt and is decidable through acceptance.
3. If a language is recursive, then the printer-TM that produces the language always halts and always produces the correct output. The order in which that language prints out is arbitrary (since languages are a set of strings). When the TM goes through the strings, it can selectively print the strings in lexicographic order, without worrying about not halting or getting a wrong output, since the language is known to be recursive.
4. A language is recursive iff the Printer-TM always halts and always produces the right answer. Given that the Printer-TM successfully prints out the language in lexicographic order and halts once the task is complete, both conditions are met. Therefore, the language is recursive.