1. True or False. T = true, F = false, and O = open, meaning that the answer is not known to science at this time.

(a) _______ Every language accepted by an NFA is accepted by some DFA.
(b) _______ Every language accepted by an NPDA is accepted by some DPDA.
(c) _______ Every language accepted by an NTM is accepted by some TM.
(d) _______
(e) _______ The class of PDAs which accept by final state is equivalent to the class of PDAs which accept by empty stack.
(f) _______ The class of 2-PDAs, that is, automata with 2 stacks, is equivalent to the class of PDAs with just one stack.
(g) _______ The class of C++ programs is equivalent to the class of Turing machines.
(h) _______ The class of Turing machines with a 2-way infinite tape is equivalent to the class of Turing machines with a semi-infinite tape.
(i) _______ The complement of any recursive language is recursive.
(j) _______ The complement of any recursively enumerable language is recursive.
2. Prove that a language $L$ is recursive if and only if there is a machine which enumerates $L$ is canonical order.
3. Prove that a language $L$ is accepted by some machine if and only if there is a machine which enumerates $L$. 
4. Prove that the halting problem is undecidable. Hint: the proof given in our textbook looks quite different from the proof I gave in class, but it is essentially the same. You might find yet another proof in another textbook or on the internet.
5. Give an unrestricted grammar which generates \( L = \{ a^{n^2} : n \geq 0 \} \).