COSC 4P61 A4 Q4

4. Given A = {< M > |M is a finite automaton and L(M) = ∅} where < M > is some encoding of the  
machine M. Is A Turing-decidable? Prove your answer.

We know (from the decision algorithms for regular languages) that L(M) is nonempty if and only M accepts a  
string of length less than n, where n is the number of states in the finite state machine.

Therefore, all we have to do to decide this language is create a Turing machine that does the following: generate all strings of lengths less than n (there are finite of them) and check to see whether any one of them is accepted. This process is guaranteed to halt.   
Therefore, the language is Turing-decidable