1. (40pts) Determine, with proof, whether each of the following language is regular:

(a) Odd numbers, written in binary.

(b) Numbers not divisible by 3, written in binary.
(c) The set of strings of zeros and ones containing the same number of zeros and ones.

(d) The set $\{0^n1^m | n > 2m\}$. 
2. (40pts) Give a finite state machine that recognizes the following language.

The set \( \{0^n 1^m | n \text{ and } m \text{ are congruent modulo 3} \} \)
3. (40pts) Determine whether 1011 belongs to the following regular sets:

(a) $10^*1^*$

(b) $0^*(10 \cup 11)^*$

(c) $1(01)^*1^*$

(d) $1^*01(0 \cup 1)$

(e) $(10)^*(11)^*$

(f) $1(00)^*(11)^*$

(g) $(10)^*1011$

(h) $(1 \cup 00)(01 \cup 0)1^*$