Automata Theory - Homework I

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1 Instructions

1. The homework is due on February 6, in class.
2. Attempt as many problems as you can. You will be given partial credit.

2 Problems

1. Given sets R, S and T, show that
$$R \cap (S \cup T) = (R \cap S) \cup (R \cap T)$$
(2 points)
2. Argue using Mathematical Induction
$$\sum_{i=1}^{n} i^3 = [\frac{(n) \cdot (n+1)}{2}]^2$$
(3 points)
3. Draw the transition diagram for a DFA accepting all strings $x \in \{0,1\}^*$, having 011 as a substring. (2 points)
4. Convert the NFA $N =< Q, \Sigma, \delta, q_0, F >$ to a DFA, where
   - $Q = \{p, q, r, s, t\}$,
   - $\Sigma = \{0, 1\}$,
   - $\delta =$

	0	1
p	{p,q}	{p}
q	{r,s}	{t}
r	{p,r}	{t}
s	ϕ	ϕ
t	ϕ	ϕ

   - $q_0 = p$,
   - $F = \{s, t\}$

   (3 points)