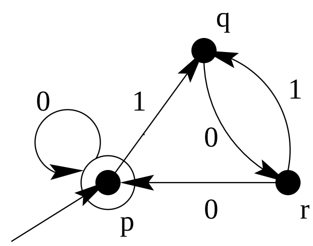
CS 381	**Introduction to Theory of Computing**	HOMEWORK 3
SUMMER 2000		DUE DATE: MON JUNE 12, 2000

1. Consider the automaton below:



   (a) Compute $\alpha_{pp}^{\{p,q,r\}}$ by choosing p as intermediate state in the first step of the algorithm.

   (b) Show (using the algebraic relations discussed in class) that the result obtained in (a) above is equal to $\varepsilon + (0 + 10)^*0$, the regular expression which we computed in two other ways in class.

2. Kozen, page 325, problem 38.

3. Let A be any subset of $\{a\}^*$. Show that A^* is regular.

4. Let $\mathcal{L} = \{b^s a^m a^k b^m \mid s, m, k \geq 1\}$. Which of the following sets are regular and which are not? Prove your claims!

   (a) $\mathcal{L}$

   (b) $\mathcal{L}^*$

   (c) $\mathcal{L}^* \cdot L(b^*)$

   (d) $(\mathcal{L} \cdot L(b^*))^*$

5. Show that the set $\{a^i b^j c^k \mid j > \gcd(i, k)\}$ is not regular.