Due by 1559 AST Friday, March 18, 2011 — **Show your work**

1. For general Σ, answer the following questions.
   (a) What is Σ^0?
   (b) How many elements are in the language Σ^n?
   (c) Write 5 elements of $\{a, b\}+$?
2. For languages L and L', describe the following:
   (a) the number of elements in LL';
   (b) the number of elements in $L \cup L'$;
   (c) the number of elements in L^*.
3. Write the following ambiguous regular expression as an unambiguous one using *all* the parentheses: $ab^*c^*|cb|a^*$.
4. Describe, in English, the language L defined by the regular expression $a^*ba^*|a^*ba^*ba^*$. How many elements are in L^n?
5. Give two regular expressions that define different infinite languages that include the strings aba, bb, a and that do not include ϵ and aa.
6. Give a regular expression for Dalhousie student "numbers".
7. Give a regular expression for Dalhousie NetIDs.
8. Write a regular expression for 10-digit phone numbers that may have spaces, hyphens or nothing in the regular spots (after 3 or 6 digits) for phone numbers.
9. Prove or disprove: All finite languages are regular.