Notes:

- Read Course Information: Section 7 (Miscellaneous) and Section 9 (Academic Dishonesty or Misconduct).
- When you are giving a construction, example, etc., provide a justification with your argument. Your solutions to numerical problems must contain the derivation of your answers. In all of your presentations, strive for correctness, completeness, and clarity. When in doubt about the assumptions of problems, the interpretations of wording, etc., consult the instructor.
- You should strive to complete all problems assigned, and a subset of them will be graded.

1. Read the notes above carefully.

2. Provide regular expressions for following languages over the alphabet $\Sigma = \{0, 1\}$. Annotate your regular expressions or provide brief explanations for your answers.
   
   (a) The language of all strings with at most one pair of consecutive 1s.
   (b) The language of all strings not containing 010 as a substring.
   (c) The language of all strings that end in even number of 0s.
   (d) The language of all strings with exactly one occurrence of the substring 000.

3. Recall that for two regular expressions (over an alphabet) $r$ and $s$, $r = s$ means that $L(r) = L(s)$. Prove or disprove the following for regular expressions $r$ and $s$ over an alphabet $\Sigma$.

   (a) $(rs + r)^*r = r(sr + r)^*$
   (b) $(r + s)^* = r^* + s^*$
   (c) $(r^*s^*)^* = (r + s)^*$

4. ... More problems may be given in later version.