1. In Class Problem - Tuesday/Thursday, October 17/19
   (a) As the initial step in the design of an SLR parser, construct the DFA that corresponds to the LR(0) item sets for the grammar. Make sure that you clearly identify the items in each set.

   \[
   S' \rightarrow S \\
   S \rightarrow A \ B \ y \\
   A \rightarrow S \ y \ | \ x \\
   B \rightarrow y \ S
   \]

   (b) Is the grammar SLR? Why or why not? Reason out your answer without constructing the entire parsing table!

   (c) Next, as the initial step in the design of an LR(1) parser, construct the DFA that corresponds to the LR(1) item sets for the grammar. Make sure that you clearly identify the items in each set.

   (d) Is the grammar LR(1)? Why or why not? Reason out your answer without constructing the entire parsing table!

   (e) Indicate the item sets of question 1c that are merged to construct the LALR(1) item sets. Is the grammar LALR(1)?

2. Take Home Problem - Due Wednesday, November 2, 11:59pm
   (a) As the initial step in the design of an SLR parser, construct the DFA that corresponds to the LR(0) item sets for the grammar. Make sure that you clearly identify the items in each set.

   \[
   S \rightarrow X \ Y \\
   X \rightarrow a \ | \ Z \ a \\
   Y \rightarrow b \ | \ b \ X \ Z \\
   Z \rightarrow a \ | \ c
   \]

   FIRST(S) = \{a, c\}  FOLLOW(S) = \{$\}\n   FIRST(X) = \{a, c\}  FOLLOW(X) = \{a, b, c\}
   FIRST(Y) = \{b\}  FOLLOW(Y) = \{$\}\n   FIRST(Z) = \{a, c\}  FOLLOW(Z) = \{a,$\}

   (b) Is the grammar SLR? Why or why not? Reason out your answer without constructing the entire parsing table!

   (c) Next, as the initial step in the design of an LR(1) parser, construct the DFA that corresponds to the LR(1) item sets for the grammar. Make sure that you clearly identify the items in each set.

   (d) Is the grammar LR(1)? Why or why not? Reason out your answer without constructing the entire parsing table!

   (e) Indicate the item sets of question 2c that are merged to construct the LALR(1) item sets. Is the grammar LALR(1)?