Homework 4
Due Friday, March 9 by 4pm.

1. (Your lucky day! Give away problem) Define “the argument with premises $A_1, \ldots, A_n$ and conclusion $B$ is valid” in terms of truth-tables.

2. True or False (explain your answer): If an argument is valid, then it might be made invalid by adding some further premises.

3. True or False (explain your answer): There could be a correctly written proof with the following line fragments:

   
   \begin{align*}
   1 \quad (1) & \quad P \quad A \\
   2 \quad (2) & \quad Q \rightarrow \neg P \quad A \\
   \vdots \quad & \quad \\
   1 \quad (n) & \quad P \rightarrow \neg Q \\
   \end{align*}

   (Here “$n$” is an arbitrarily large number.)

4. Write a sentence $\phi$ that contains only $\land, \neg, P, Q$ and that has the following truth table.

   \[
   \begin{array}{c|c|c|c}
   P & Q & \phi \\
   \hline
   T & T & F \\
   T & F & T \\
   F & T & T \\
   F & F & F \\
   \end{array}
   \]

5. True or False (explain your answer): The sentence

   \[ P \rightarrow (Q \rightarrow (R \rightarrow S)) \]

   has a substitution instance that is an inconsistency.