\documentclass[11pt]{article}

% To produce a letter size output. Otherwise will be A4 size.

\usepackage[letterpaper]{geometry}

% For enumerated lists using letters: a. b. etc.

\usepackage{enumitem}

\topmargin -.5in

\textheight 9in

\oddsidemargin -.25in

\evensidemargin -.25in

\textwidth 7in

\begin{document}

% Edit the following putting your first and last names and your lab section.

\author{Andre Martin\\

Lab CSE-015-07L F 1:30-4:20pm}

% Edit the following replacing X with the HW number.

\title{CSE 015: Discrete Mathematics\\

Fall 2019\\

Homework \#1\\

Solution}

% Put today's date in the following.

\date{September 20, 2019}

\maketitle

% ========== Begin questions here

\begin{enumerate}

\item

\textbf{Question 1:}

\begin{enumerate}[label=(\alph\*)]

\item

I did not buy a lottery ticket this week.

\item

If I bought a lottery ticket this week, then I will win the million dollar jackpot on Friday.

\item

I bought a lottery ticket this week, and I won the million dollar jackpot on Friday.

\item

I will win the million dollar jackpot on Friday if and only if I buy a lottery ticket this week.

\item

If I do not buy the lottery ticket this week, then I will not win the million dollar jackpot on Friday.

\end{enumerate}

\item

\textbf{Question 2:}

\begin{enumerate}[label=(\alph\*)]

\item

$p \rightarrow \neg q$

\item

$p \rightarrow q \rightarrow r$

\item

$r \rightarrow p$

\item

$q \rightarrow p \rightarrow r$

\item

$(p \wedge q) \rightarrow r)$

\item

$(r \Leftrightarrow (q \vee p))$

\end{enumerate}

\item

\textbf{Question 3:}

\begin{enumerate}[label=(\alph\*)]

\item

\begin{tabular}{|c|c|c|}

\hline

p & \neg p & p \rightarrow \neg p\\

\hline

T & F & F\\

\hline

F & T & T\\

\hline

\end{tabular}

\item

\begin{tabular}{|c|c|c|}

\hline

p & \neg p & p \Leftrightarrow \neg p\\

\hline

F & T & F\\

\hline

T & F & F\\

\hline

\end{tabular}

\item

\begin{tabular}{|c|c|c|c|c|}

\hline

p & q & $p \wedge q$ & $p \vee q$ & $(p \wedge q)$ \rightarrow (p \vee q)\\

\hline

T & T & F & T & F \\

\hline

T & F & T & T & F\\

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F & T & F & T & F\\

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F & F & F & T & F\\

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\end{tabular}

\item

\begin{tabular}{|c|c|c|c|c|}

\hline

p & q & q \rightarrow \neg p & p \leftrightarrow q & (q \rightarrow \neg p) \Leftrightarrow (p \Leftrightarrow q)\\

\hline

T & T & F & T & F \\

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T & F & T & F & F\\

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F & T & T & F & F\\

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F & F & T & T & T\\

\hline

\end{tabular}

\end{enumerate}

\item

\textbf{Question 4:}

\begin{enumerate}[label=(\alph\*)]

\item

$r \rightarrow \neg q$

\item

$(r \wedge p) \rightarrow q$

\item

$\neg q \rightarrow \neg r$

\item

$\neg p \vee r \rightarrow q $

\end{enumerate}

\textbf{Question 5:}

\begin{enumerate}[label=(\alph\*)]

\item

\begin{tabular}{|c|c|c|c|c|c|c|}

\hline

p & q & r & $p \vee q$ & $(p \vee q)$ & $q \vee r$ & $p \vee (q \vee r)$\\

\hline

T & T & T & T & T & T & T\\

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T & T & F & T & T & T & T\\

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T & F & T & T & T & T & T\\

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T & F & F & T & T & F & T\\

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F & F & F & F & F & F & F\\

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\begin{tabular}{|c|c|c|c|c|c|c|}

\hline

p & q & r & $p \wedge q$ & $(p \wedge q)$ & $q \wedge p$ & p $\wedge$ ($q \wedge r$)\\

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T & T & F & T & F & T & F\\

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F & F & T & F & F & F & F\\

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F & F & F & F & F & F & F\\

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\end{tabular}

\end{enumerate}

\textbf{Question 6:}

\begin{enumerate}[label=(\alph\*)]

\item

\begin{tabular}{|c|c|c|c|c|c|}

\hline

p & q & \neg p & $(p \vee q)$ & \neg p \wedge (p \vee q)$ & ($\neg p \wedge (p \vee q)) \rightarrow q\\

\hline

T & T & F & T & F & T\\

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T & T & F & T & F & T\\

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F & T & T & T & T & T\\

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F & T & T & F & F & T\\

\hline

\end{tabular}

\item

\begin{tabular}{|c|c|c|c|c|c|c|}

\hline

p & q & r & (p \rightarrow q) & (q \rightarrow r) & (p \rightarrow q) \wedge (q \rightarrow r) & (p \rightarrow q) \wedge q \rightarrow r) \rightarrow (p \rightarrow r)\\

\hline

T & T & T & T & T & T & T\\

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T & T & F & T & T & F & T\\

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F & F & F & T & F & T & T\\

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\end{tabular}

\item

\begin{tabular}{|c|c|c|c|c|}

\hline

p & q & p \rightarrow q & $p \wedge (p \rightarrow q)$ & $(p \wedge (p \rightarrow q)$ \rightarrow q\\

\hline

T & T & T & T & T\\

\hline

T & F & F & F & T\\

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F & T & T & F & T\\

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F & F & T & F & T\\

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\end{tabular}

\end{enumerate}

\end{enumerate}

\end{document}