H1P1. (1) Page 16: 4. Let \( p \) and \( q \) be the propositions
   \[ p : I \text{ bought a lottery ticket this week.} \]
   \[ q : I \text{ won the million dollar jackpot on Friday.} \]
Express each of these propositions as an English sentence.
   a) \( \neg p \)
   b) \( p \lor q \)
   c) \( p \land q \)
   d) \( p \rightarrow q \)
   e) \( p \leftrightarrow q \)
   f) \( \neg p \rightarrow \neg q \)
   g) \( \neg p \lor \neg q \)
   h) \( \neg p \lor (p \rightarrow q) \)

H1P 2. (2) Page 17: 6. Let \( p \) and \( q \) be the propositions "The election is decided" and
   "The votes have been counted," respectively. Express each of these compound
propositions as an English sentence.
   a) \( \neg p \)
   b) \( p \land q \)
   c) \( \neg p \rightarrow q \)
   d) \( q \land \neg p \)
   e) \( \neg q \lor \neg p \)
   f) \( \neg p \land \neg q \)
   g) \( p \lor q \)
   h) \( \neg q \lor (\neg p \rightarrow q) \)

H1P 3. (3) Page 17: 8. Let \( p, q, \) and \( r \) be the propositions
   \[ p : You \text{ have the flu.} \]
   \[ q : You \text{ miss the final examination.} \]
   \[ r : You \text{ pass the course.} \]
Express each of these propositions as an English sentence.
   a) \( p \land q \)
   b) \( \neg q \land r \)
   c) \( q \land \neg r \)
   d) \( p \land q \land r \)
   e) \( (p \land \neg r) \lor (q \land \neg r) \)
   f) \( (p \rightarrow q) \lor (\neg q \rightarrow r) \)
H1P 4. (4) Page 17 : 10. Let p, q, and r be the propositions:
- p : You get an A on the final exam.
- r : You get an A in this class.
Write these propositions using p, q, and r and logical connectives.
a) You get an A in this class, but you do not do every exercise in this book.
b) You get an A on the final, you do every exercise in this book, and you get an A in this class.
c) To get an A in this class, it is necessary for you to get an A on the final.
d) You get an A on the final, but you don't do every exercise in this book; nevertheless, you get an A in this class.
e) Getting an A on the final and doing every exercise in this book is sufficient for getting an A in this class.
f) You will get an A in this class if and only if you either do every exercise in this book or you get an A on the final.

H1P 5. (5) Page 19 : 26. How many rows appear in a truth table for each of these compound propositions?
a) (q △ p) \; \land \; (\sim \; p \; \land \; \sim \; q)
b) (p \; \rightarrow \; \sim \; t) \; \rightarrow \; (p \; \rightarrow \; \sim \; s)
c) (p \; \rightarrow \; q) \; \land \; (\sim \; s \; \rightarrow \; t) \; \land \; (\sim \; u \; \lor \; v)
d) (p \; \rightarrow \; r \; \rightarrow \; s) \; \land \; (q \; \rightarrow \; t) \; \land \; (r \; \rightarrow \; \sim \; t)

H1P 6. (6) Page 19 : 28. Construct a truth table for each of these compound propositions.
a) p \; \sim \; p
b) p \; \leftrightarrow \; \sim \; p
c) p \; \land \; (p \; \rightarrow \; q)
d) (p \; \rightarrow \; q) \; \land \; (p \; \rightarrow \; q)
e) (q \; \sim \; q) \; \rightarrow \; (p \; \rightarrow \; q)
f) (p \; \leftrightarrow \; q) \; \land \; (p \; \leftrightarrow \; \sim \; q)

H1P 7. (7) Page 28 : 8 Use DeMorgan's Laws to find the negation of each of the following statements.
a) Kwame will take a job in industry or go to graduate school.
b) Yoshiko knows Java and Calculus.
c) James is young and strong.
d) Rita will move to Oregon or Washington.

H1P 8. (8) Page 28 : 10 Show that each of these conditional statements is a tautology by using truth tables.
a) \; [\sim \; p \; \land \; (p \; \lor \; q)] \; \rightarrow \; q
b) \; [(p \; \rightarrow \; q) \; \land \; (q \; \rightarrow \; r)] \; \rightarrow \; (p \; \rightarrow \; r)
c) \; [p \; \land \; (p \; \rightarrow \; q)] \; \rightarrow \; q
d) \; [(p \; \lor \; q) \; \land \; (p \; \rightarrow \; r) \; \land \; (q \; \rightarrow \; r)] \; \rightarrow \; r
H1P 9. (9) Page 28: 12 Show that each of these conditional statements is a tautology without using truth tables.

a) \[\neg p \land (p \lor q) \rightarrow q\]

b) \[((p \rightarrow q) \land (q \rightarrow r)) \rightarrow (p \rightarrow r)\]

c) \[p \land (p \rightarrow q) \rightarrow q\]

d) \[[(p \lor q) \land (p \rightarrow r) \land (q \rightarrow r)] \rightarrow r\]