1. Find truth values for the propositional variables $A$, $B$, and $C$ such that the truth value of the following wff is false.

$$(A \lor B \rightarrow C) \land A \rightarrow (C \rightarrow B)$$

$A = \underline{\hspace{2cm}}$ $B = \underline{\hspace{2cm}}$ $C = \underline{\hspace{2cm}}$

2. Use basic equivalences to prove the following equivalence.

$$\neg ((\neg A \land B) \lor (A \land \neg B)) \equiv (\neg A \land \neg B) \lor (A \land B)$$

3. Use basic equivalences to prove that the following wff is a tautology. In other words, show the wff is equivalent to true.

$$\neg B \land (A \rightarrow B) \rightarrow \neg A$$
4. Demonstrate the use of Quine’s method to find out whether the following wff is a tautology, a contradiction, or a contingency.

\[(A \rightarrow B) \rightarrow (A \vee C \rightarrow B \vee \neg C)\]

5. Given the truth function \(f\) defined by the following table:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>(f(A,B))</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>true</td>
<td>true</td>
</tr>
<tr>
<td>true</td>
<td>false</td>
<td>false</td>
</tr>
<tr>
<td>false</td>
<td>true</td>
<td>false</td>
</tr>
<tr>
<td>false</td>
<td>false</td>
<td>true</td>
</tr>
</tbody>
</table>

a. Write \(f(A, B)\) in CNF (conjunctive normal form).

b. Write \(f(A, B)\) in DNF (disjunctive normal form).
6. Find a DNF and a CNF for the following wff. (Full normal form is not required.)

\[(A \rightarrow B) \rightarrow (C \rightarrow D)\]

7. Find a full DNF for the following wff.

\[A \rightarrow (B \lor \neg C)\]