

Name: Answer Key

1. [2 parts, 1 point each] Using letters  $W$ ,  $M$ , and  $V$ , translate the following statements into symbolic notation.

(a) If the car works properly and is regularly maintained, then the car is valuable.

$$W \wedge M \rightarrow V$$

(b) Regular maintenance is a necessary for the car to work properly and be valuable.

$$W \wedge V \rightarrow R$$

2. [4 parts, 1 point each] Write the negation of the following statements using simple and natural English sentences.

(a) The Gamecocks practice on Tuesdays and play matches on Fridays.

The Gamecocks do not practice on Tuesdays or they do not play matches on Fridays.

(b) If it is hot, then the car overheats.

It is hot but the car does not overheat.

(c) Either it will rain or it will snow, but not both.

It will rain if and only if it will snow.

(d) Either the processor is fast and the printer is slow, or else the file is damaged.

The processor is slow or the printer is fast, and the file is not damaged.

3. Two parts.

(a) [3 points] Write a truth table for the following wff:

$$(A \rightarrow B) \wedge (B' \vee C) \wedge (C \rightarrow A) \wedge (B \leftrightarrow C)'$$

$P_1 \quad P_2 \quad P_3 \quad P_4$

A	B	C	$A \rightarrow B$	$B' \vee C$	$C \rightarrow A$	$B \leftrightarrow C$	$(B \leftrightarrow C)'$	$P_1 \wedge P_2 \wedge P_3 \wedge P_4$
T	T	T	T	T	T	T	F	F
T	T	F	T	F	T	F	T	F
T	F	T	F	T	T	F	T	F
T	F	F	F	T	T	T	F	F
F	T	T	T	T	F	T	F	F
F	T	F	T	F	T	F	T	F
F	F	T	T	T	F	F	T	F
F	F	F	T	T	T	T	F	F

(b) [1 point] Is the wff a tautology, a contradiction, or neither? Briefly explain why.

This is a contradiction, since the sentence is false regardless of the truth values of A, B, and C.