MAT 299 - Proofs and Problem Solving

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Homework 1 - Saturday, November 3rd, 2018

1.1 §1 Differential Equations

Problem 1 *Analyze the logical forms of the following statements. Use A to represent "Alice has a dog," B to represent "Bob has a dog," and C to represent "Carol has a cat" to write each as a symbolic statement.*

1. *Either Alice or Bob has a dog.*
   $A \vee B$
2. *Neither Alice nor Bob has a dog, but Carol has a cat.*
   $\neg(A \wedge B) \wedge C$
3. *Either Alice has a dog and Carol has a cat, or Bob has a dog and Carol does not have a cat.*
   $(A \wedge C) \vee (B \wedge \neg C)$

This is similar to Example 1.1.2 and to Exercise 2 in Section 1.1 of your SNHU MAT299 textbook.

Problem 2 *If D stands for "Doug is tall" and E stands for "Edie is short," what English sentences are represented by the following expressions?*

1. $(D \wedge E) \vee \neg D$
   Either Doug is tall and Edie is short, or Doug is not tall
2. $(D \vee \neg E) \wedge \neg(D \wedge E)$
   Either Doug is tall or Edie is not short and both Doug is not tall and Edie is not short

3. $\neg D \wedge ((E \wedge D) \vee \neg E)$
   Doug is not tall and either Edie is short and Doug is tall, or Eddie is not short

This is similar to Example 1.1.3 and to Exercise 6 in Section 1.1 of your SNHU MAT299 textbook.

Problem 3 *Make a truth table for the following formula.*

$$(G \vee \neg H) \wedge \neg(G \wedge L)$$

This is similar to Example 1.2.2 and to Exercise 2 in Section 1.2 of your SNHU MAT299 textbook.

G	H	L	$\neg H$	$G \vee \neg H$	$G \wedge L$	$\neg G \wedge L$	$(G \vee \neg H) \wedge \neg(G \wedge L)$
T	T	T	F	T	T	F	F
T	T	F	F	T	F	T	T
T	F	T	T	T	T	F	F
T	F	F	T	T	F	T	T
F	T	T	F	F	F	T	F
F	T	F	F	F	F	T	F
F	F	T	T	T	F	T	T
F	F	F	T	T	F	T	T

Problem 4 *Use truth tables to determine which of the following formulas are equivalent to each other.*

1. *(J ? K) ? (J ? K)*
2. *J ? K*
3. *J ? K*
4. *(J ? K)*
5. *(J ? K) ? K*

SNHU MAT299 Page 3 of 3 Module One Homework This is similar to Example 1.2.4 and to Exercise 8 in Section 1.2 of your SNHU MAT299 textbook.

$\vee$ Or Vee
$\wedge$ and Wedge
$\neg \cup \vee \wedge$