<div align="center">
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Homework Assignment 1
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Knowledge Representation

1. It is not cloudy and it is not raining.

   - **Solution**
     Let p = It is not cloudy, and let q = it is not raining. Then p $\wedge q$

2. I like to eat apples and bananas..

   - **Solution**
     Let p = apples, and let q = bananas. Then p v q

3. Behind the clouds the sun is shining.

   - **Solution**
     Let p = behind the clouds, and let q = the sun is shinning. Then p $\wedge q$

4. If a function is differentiable then the function is continuous..

   - **Solution**
     Let p = If a function is differentiable, and let q = then the function is continuous. Then p $\rightarrow$ q

5. I will study for the final otherwise I will fail..

   - **Solution**
     Let p = will study for the final, and let q = I will fail Then p $\rightarrow$ q

Equivalence in Propositional Logic

1. p $\wedge q$ $\quad$ *and* $\quad$ $p \vee \neg q$

   - **Solution**

$$
\begin{array}{cc|c|c}
A & B & C & D \\
p & q & p \wedge q & p \vee \neg q \\
T & T & T & T \\
T & F & F & T \\
F & T & F & F \\
F & F & F & T
\end{array} \quad Col.C \neq Col.D
$$

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2. p ∨ q   *and*   ¬p ∧ ¬q

   – **Solution**

A	B	C	D	E	F	
p	q	$\neg p$	$\neg q$	$p \vee q$	$\neg p \vee \neg q$	
T	T	F	F	T	F	$Col.E \neq Col.F$
T	F	F	T	T	T	
F	T	T	F	T	T	
F	F	T	T	F	T	

3. p → q *and* ¬p → ¬q

   – **Solution**

A	B	C	D	E	F	
p	q	$\neg p$	$\neg q$	$p \longrightarrow q$	$\neg p \longrightarrow \neg q$	
T	T	F	F	T	T	$Col.E = Col.F$
T	F	F	T	F	F	
F	T	T	F	T	T	
F	F	T	T	T	T	

4. p → q *and* ¬p ∨ q

   – **Solution**

A	B	C	D	E	
p	q	$\neg p$	$p \longrightarrow q$	$\neg p \vee q$	
T	T	F	T	T	$Col.D = Col.E$
T	F	F	F	F	
F	T	T	T	T	
F	F	T	T	T	

5. ¬(p ∧ q) *and* ¬p ∨ ¬q

   – **Solution**

A	B	C	D	E	F	G	H	
p	q	$\neg p$	$\neg q$	$p \wedge q$	$p \vee q$	$\neg(p \wedge q)$	$\neg p \vee \neg q$	
T	T	F	T	T	T	F	F	$Col.G \neq Col.H$
T	F	F	F	F	T	T	F	
F	T	T	T	F	T	T	F	
F	F	T	T	F	F	T	T	