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**CS2200 F-24 Homework**

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1. Epp5 problem 2.2.6 / p63.
2. Epp5 problem 2.2.14 / p63.
3. Epp5 problem 2.2.38 / p65.
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5. Epp5 problem 2.3.4 / p76.
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1. Epp5 problem 2.2.6 / p63

$$6. (p \vee q) \vee (\neg p \wedge q) \rightarrow q$$

Truth table :-

	p	q	$\neg p$	$p \vee q$	$\neg p \wedge q$	
	T	T	F	T	F	
	T	F	F	T	F	
	F	T	T	T	F	
	F	F	T	F	F	

$$(p \vee q) \vee (\neg p \wedge q) \quad (p \vee q) \vee (\neg p \wedge q) \rightarrow q$$

	T			
	T			
	F			

Epps problem 22.14 (p63)

$$\begin{array}{cccc} p \wedge q & p \wedge q \rightarrow r & p \neg r & p \neg r \rightarrow q \\ \hline F & T & T & F \end{array}$$

	$\text{Pr} \rightarrow \text{R}$	$\text{Pr} \rightarrow \text{X}$	$\text{Pr} \rightarrow \text{Y}$
$\text{Pr} \rightarrow \text{R}$	T	F	T
$\text{Pr} \rightarrow \text{X}$	F	T	F
$\text{Pr} \rightarrow \text{Y}$	T	F	T
$\text{Pr} \rightarrow \text{R} \wedge \text{Pr} \rightarrow \text{X}$	F	F	T
$\text{Pr} \rightarrow \text{R} \wedge \text{Pr} \rightarrow \text{Y}$	F	T	F
$\text{Pr} \rightarrow \text{X} \wedge \text{Pr} \rightarrow \text{Y}$	T	F	F
$\text{Pr} \rightarrow \text{R} \vee \text{Pr} \rightarrow \text{X}$	T	T	T
$\text{Pr} \rightarrow \text{R} \vee \text{Pr} \rightarrow \text{Y}$	T	F	T
$\text{Pr} \rightarrow \text{X} \vee \text{Pr} \rightarrow \text{Y}$	F	T	T

## Logical Equivalence

form 2:

$$p \rightarrow (q \vee r) = \neg p \vee (q \vee r)$$

form 1:

$$p \wedge \neg q \vee r = (p \wedge \neg q) \vee r$$

form 3:

$$p \wedge \neg r \rightarrow q = \neg(p \wedge \neg r) \vee q$$

Statement:

"If  $n$  is prime, then  
 $n$  is odd or  $n$  is 2."

$$\begin{array}{l} p = \text{prime} \\ q = \text{odd} \\ n = 2 \end{array}$$

So,

$$p \rightarrow (q \vee r)$$

form 2:

$$P_1 \sim q \downarrow r$$

this read as:-

if  $p$  is prime  $n$  is not  
, then  $n$  is 2.

form 3:-

$$P_1 \sim r \rightarrow q$$

if  $p$  is prime and  $n$  is  
2, then  $n$  is odd.

Q3 EPPS Problem 2.2-38 (pts)

(38). Ann will go unless it rains.

If it does not rain,  
then Ann will go.

Epps problem 2-2-43 / P65

43. Doing homework regularly  
is a necessary condition  
for Jim to pass the course.

Contrapositive:-

If Jim does not pass the  
course then he is not  
doing homework regularly.

~~EPPS problem 2-3.4 / p76~~

Premise 1: If this graph  
can be colored with  
three colors, then it can  
be colored with four colors.

Premise 2: This graph cannot  
be colored with  
four colors.

i:-

Inference! - This graph cannot  
be colored with  
three colors.

Epps problem 2-3-10 / P77

$$6. \quad p \vee q \rightarrow r$$

$$\therefore \neg r \rightarrow \neg(p \vee q)$$

Truth table:

$p$	$q$	$r$	$p \vee q$	$p \vee q \rightarrow r$	$\neg r$	$\neg(p \vee q)$	$\neg(p \vee q) \rightarrow \neg r$
T	T	T	T	T	F	T	T
T	T	F	T	F	T	F	F
T	F	T	T	T	F	T	T
T	F	F	F	T	T	F	F
F	T	T	T	T	F	T	T
F	T	F	T	F	T	F	F
F	F	T	F	T	F	T	T
F	F	F	F	T	T	F	F

Premise:  $P \vee Q \rightarrow P$

Conclusion:  $\neg P \wedge (\neg P \vee P)$

The argument is invalid because there are cases where the premise are true but the conclusion is false.

Epps. problem 2-3-11 / P7			
Truth table.			
P	Q	R	$P \wedge (Q \vee R)$
T	T	T	T
T	T	F	T
T	F	T	F
T	F	F	F
F	T	T	F
F	T	F	F
F	F	T	F
F	F	F	F

Premise:  $p \vee (q \wedge r)$

Conclusion:  $\neg q \vee \neg r$

2nd:  $\neg p \vee \neg r$

The argument is invalid  
because there are  
scenarios where the  
premises hold true  
while the first conclusion  
is false.

EPPS problem 2-3-23 1pt

Q.no-23.

John,  
6ft,

p represent "Oleg is

q represent "Oleg is reg-  
istered to take Math 362."

r represent "Oleg is an  
economics major"

Logical form:-

1.  $p \vee r$

2.  $p \rightarrow r$

3.  $r \vee \neg q$

Truth table :-

A handwritten musical score for a 12-string guitar, consisting of 12 staves. The staves are arranged vertically, with each staff representing a different string. The notes are indicated by vertical tick marks, and rests are shown as horizontal dashes. The score begins with a treble clef and a common time signature. The first few measures show a simple harmonic progression. A large, handwritten bracket groups the first six measures together. In the middle of the page, there is a section of lyrics written in cursive script, which appears to be "I'm gonna sing a song about you". The handwriting is fluid and personal, typical of a home-sketched musical composition.

Premise! -

$p \vee r$  and  $p \rightarrow q$

Conclusion! -

$r \wedge q$

The argument is valid  
because premises are  
true also leads to a  
true conclusion.