

# A#15 Ch. 3 Review (Do Circled)

①  $(p \wedge q) \rightarrow r$

If p and q, then r.

④  $r \leftrightarrow (p \wedge q)$

r, if and only if p and q.

⑤  $\neg(p \wedge q)$   
Not p and not q.

⑦  $(p \wedge q) \vee r$

⑨  $q \rightarrow (p \leftrightarrow r)$

⑩  $r \leftrightarrow (p \wedge \neg q)$

⑫  $q \rightarrow \neg r$

⑭ All, some, or at least one student majors in business

⑮ All or no democrats are not registered voters.

⑱  $p \vee (\neg p \wedge q)$

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

Neither

②①  $p \rightarrow (\sim p \vee q)$

p	q	$\sim p$	$\sim p \vee q$	$p \rightarrow (\sim p \vee q)$
T	T	F	T	T
T	F	F	F	F
F	T	T	T	T
F	F	T	T	T

Neither

②③  $(p \vee q) \rightarrow \sim r$

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

Neither

②④ a. p: I'm in class       $(p \vee q) \wedge \sim p$   
           q: I'm studying

b.

p	q	$p \vee q$	$\sim p$	$(p \vee q) \wedge \sim p$
T	T	T	F	F
T	F	T	F	F
F	T	T	T	T
F	F	F	T	F

c. Statement is true when p is False and q is true

$p: T$   
 $q: F$   
 $r: F$

(28)  $\sim(q \leftrightarrow r)$   
 $\sim(F \leftrightarrow F)$   
 $\sim(T)$   
 $\boxed{F}$

(29)  $(p \wedge q) \rightarrow (p \vee r)$   
 $(T \wedge F) \rightarrow (T \vee F)$   
 $(F) \rightarrow (T)$   
 $\boxed{T}$

(32)  $p$ : Diversity index is 47  
 $q$ : Index increased from 2000 to 2010

$p \wedge \sim q$

$\boxed{\text{False}}$  Statement because graph shows that it does increase from 2000 to 2010

(35) a) Prove  $\sim p \vee q \equiv p \rightarrow q$

$p$	$q$	$\sim p$	$\sim p \vee q$	$p \rightarrow q$
T	T	F	T	T
T	F	F	F	F
F	T	T	T	T
F	F	T	T	T

$\boxed{\sim p \vee q} \equiv \boxed{p \rightarrow q}$

They are equivalent.

b) If the triangle is isosceles then it has two equal sides.

36)  $p$ : Grows mangoes       $p \vee q$   
 $q$ : Grows oranges

- a)  $p \rightarrow \sim q$
- b)  $q \rightarrow \sim p$
- c)  $\sim p \rightarrow q$
- d)  $p \wedge q$

C

$p$	$q$	(a) $p \vee q$	(b) $p \rightarrow \sim q$	(c) $q \rightarrow \sim p$	(d) $\sim p \rightarrow q$	(e) $p \wedge q$
T	T	T	F	F	T	T
T	F	T	T	T	T	F
F	T	T	T	T	T	F
F	F	F	T	F	F	F

37) Is  $\sim(p \leftrightarrow q) \equiv \sim p \vee \sim q$ ?

$p$	$q$	$p \leftrightarrow q$	$\sim(p \leftrightarrow q)$	$\sim p$	$\sim q$	$\sim p \vee \sim q$
T	T	T	F	F	F	F
T	F	F	T	F	T	T
F	T	F	T	T	F	T
F	F	T	F	T	T	T

Not equivalent

- 40) Conditional: If I'm in class, then not holiday
- Converse: If not a holiday, then I'm in class
- Inverse: If I'm not in class, then it is holiday
- Contrapositive: If it's a holiday, then I'm not in class

(43) If an argument is not sound, then it's not valid.

(53) a and b are equivalent (See work at end of assignment)

(57)  $p \wedge q$   
 $q \rightarrow r$   
 $\therefore p \rightarrow r$

	(a)	(b)	(c)	(d)		
	$p \wedge q$	$q \rightarrow r$	$(a) \wedge (b)$	$p \rightarrow r$	$(c) \rightarrow (d)$	
$p$	T	T	T	T	T	Valid
$q$	T	F	F	F	T	
$r$	T	T	F	T	T	
	F	F	F	F	T	
	F	T	F	T	T	
	F	F	F	T	T	
	F	T	F	T	T	
	F	F	F	T	T	

(61)  $p \rightarrow q$   
 $\sim q$   
 $\therefore \sim p$

$p$ : Good baseball player  
 $q$ : Good eye hand coordination

	(a)	(b)	
	$p \rightarrow q$	$\sim q$	$(p \rightarrow q) \wedge \sim q$
$p$	T	F	F
$q$	F	T	F
	T	F	F
	F	F	T

  

	(a)	(b)	
	$\sim p$	$a \rightarrow b$	
$p$	F	T	Valid
$q$	F	T	
	F	F	
	T	T	

Work for #53

53)  $p$ : She played  
 $q$ : We lost

a)  $\sim p \rightarrow q$

b)  $\sim q \rightarrow p$

c)  $\sim p \wedge \sim q$

$p$	$q$	$\sim p$	$\sim p \rightarrow q$	$\sim q$	$\sim q \rightarrow p$	$\sim p \wedge \sim q$
T	T	F	T	F	T	F
T	F	F	T	T	T	F
F	T	T	T	F	T	F
F	F	T	F	T	F	T

