

but  $\rightarrow$  and

Let  $p$  and  $q$  be the propositions

$p$  : It is below freezing.

$q$  : It is snowing.

$$\checkmark \quad \neg p \wedge q$$

Write these propositions using  $p$  and  $q$  and logical connectives (including negations).

- a) It is below freezing and snowing.  $\rightarrow p \wedge q$
- b) It is below freezing but not snowing.  $\rightarrow p \wedge \neg q$
- c) It is not below freezing and it is not snowing.  $\rightarrow \neg p \wedge \neg q$   $\neq \neg(p \wedge q)$
- d) It is either snowing or below freezing (or both).  $\rightarrow p \vee q$
- e) If it is below freezing, it is also snowing.  
 $\downarrow$   
 $\rightarrow p \rightarrow q$

Let  $p$ ,  $q$ , and  $r$  be the propositions

$p$  : You have the flu.

$q$  : You miss the final examination.

$r$  : You pass the course.

Express each of these propositions as an English sentence.

- a)  $p \rightarrow q$
- b)  $\neg q \leftrightarrow r$
- c)  $q \rightarrow \neg r$
- d)  $p \vee q \vee r$
- e)  $(p \rightarrow \neg r) \vee (q \rightarrow \neg r)$

a) If you have the flu then you miss the final examination.

b) You do not miss the final exam if and only if you pass the course.

c)  $\neg q \rightarrow r$

If then  
you miss the final exam only if you do not pass the course.

$$\neg q \rightarrow r$$

e)  $\neg p \rightarrow q$

if you have the flu, then you cannot pass the course or if you miss the examination then you cannot pass the course.

- 2) Let P: This is a great website, Q: You should come back here. Then 'This is a great website and you should come back here.' is best represented by?

a)  $\neg P \vee \neg Q$

b)  $P \wedge \neg Q$

c)  $P \vee Q$

$$P \wedge Q$$

2) Let P: This is a great website, Q: You should not come back here. Then 'This is a great website and you should come back here.' is best represented by?

- a)  $\sim P \vee \sim Q$
- ~~b)  $P \wedge \sim Q$~~
- c)  $P \vee Q$
- d)  $P \wedge Q$

$$P \wedge Q$$

3) Let P: We should be honest., Q: We should be dedicated., R: We should be overconfident. Then 'We should be honest or dedicated but not overconfident.' is best represented by?

$$P \vee Q \wedge \sim R$$

- a)  $\sim P \vee \sim Q \vee R$
- b)  $P \wedge \sim Q \wedge R$
- c)  $P \vee Q \wedge R$
- ~~d)  $P \vee Q \wedge \sim R$~~

Truth Table for Compound proposition :-

$$2^2 = 4$$

		$\neg P \wedge Q$	
$P$	$Q$	$\neg P$	$\neg P \wedge Q$
T	T	F	F
T	F	F	F
F	T	T	T
F	F	T	F

		$(P \vee \neg Q) \rightarrow Q$	
$P$	$Q$	$\neg Q$	$P \vee \neg Q$
T	T	F	T
T	F	T	T
F	T	F	F
F	F	T	T

$$\begin{aligned} & P \rightarrow Q \\ & T \rightarrow F = F \\ & F \rightarrow T = T \end{aligned}$$

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

$$P, q, \Delta$$

$$\checkmark \neg p \rightarrow (q \rightarrow r)$$

$p, q, r$

$$2^3 = 8$$

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

If  $p$  is true,  
 $q$  is false  
and  $r$  is true

then the truth value of  
 $\neg p \rightarrow (q \rightarrow r)$  is

④

16) Give the number of rows in the truth table for the compound statement.

$$(p \vee q) \wedge (\neg r \vee s) \vee \neg t$$

- A) 25   B) 10   C) 8   D) 32

$$2^5 = 32$$

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