

f) No    3. a) Linda is not younger than Sanjay.    b) Mei does not make more money than Isabella.    c) Moshe is not taller than Monica.    d) Abby is not richer than Ricardo.    5. a) Mei

than Monica.    d) Abby is not richer than Ricardo.    5. a) Mei does not have an MP3 player.    b) There is pollution in New Jersey.    c)  $2 + 1 \neq 3$ .    d) The summer in Maine is not hot or it is not sunny.    7. a) Steve does not have more than 100

half of the sentence.)    13. a)  $p \wedge q$     b)  $p \wedge \neg q$     c)  $\neg p \wedge \neg q$     d)  $p \vee q$     e)  $p \rightarrow q$     f)  $(p \vee q) \wedge (p \rightarrow \neg q)$     g)  $q \leftrightarrow p$     15. a)  $\neg p$

f)  $(p \wedge r) \rightarrow \neg q$     19. a) False    b) True    c) True    d) True

21. a) Exclusive or: You get only one beverage.    b) Inclusive or: Long passwords can have any combination of symbols.    c) Inclusive or: A student with both courses is even more qualified.    d) Either interpretation possible; a traveler might wish to pay with a mixture of the two currencies, or the store may not allow that.    23. a) Inclusive or: It is allowable to take

close school. Certainly the inclusive or is intended.    25. a) If the wind blows from the northeast, then it snows.    b) If it stays warm for a week, then the apple trees will bloom.    c) If the Pistons win the championship, then they beat the Lakers.    d) If you get to the top of Long's Peak, then you must have walked 8 miles.    e) If you are world famous, then you will get tenure as a professor.    f) If you drive more than 400 miles, then you will need to buy gasoline.    g) If your guarantee is good, then you must have bought your CD player less than 90 days ago.    h) If the water is not too cold, then Jan will go swimming.    i) If people believe in science, then we will have a future.    27. a) You buy an ice cream cone if and only if it is

35. For parts (a), (b), (c), (d), and (f) we have this table.

$p$	$q$	$(p \vee q) \rightarrow (p \oplus q)$	$(p \oplus q) \rightarrow (p \wedge q)$	$(p \vee q) \oplus (p \wedge q)$	$(p \leftrightarrow q) \oplus (\neg p \leftrightarrow q)$	$(p \oplus q) \rightarrow (p \oplus \neg q)$
T	T	F	T	F	T	T
T	F	T	F	T	T	F
F	T	T	F	T	T	F
F	F	T	T	F	T	T

## Truth Table to Compound Propositions (not in textbook)

### Solution:

- $x : \neg p \wedge \neg q$
- $y : \neg p \vee q \vee r$  The following statement is true when we want a false:  $p \wedge \neg q \wedge \neg r$ .  
So we negate it:  $\neg(p \wedge \neg q \wedge \neg r) \equiv \neg p \vee q \vee r$ .
- $z : r \vee (\neg p \wedge \neg q)$  Since there are less Falses than Trues in the  $z$ -column I decided to focus on the Falses (come up with a statement that returns true when  $z$  is false) and then negate this statement afterwards.  
 $\neg r \wedge \neg(\neg p \wedge \neg q)$  (returns true when  $z$  is false)  
 $\neg r \wedge (p \vee q)$  (returns true when  $z$  is false)  
\*NEGATE THIS STATEMENT (to return true when  $z$  is true)  
 $\neg[\neg r \wedge (p \vee q)]$   
 $r \vee \neg(p \vee q)$   
 $r \vee (\neg p \wedge \neg q)$