

HW1 Solutions

1) All swans are white.
Statement

5) There is no largest number.
Statement

9) This is exercise number 9.
Not a statement,
self-referential

12) $p \vee q$

13) $p \wedge q \wedge r$

14) $(p \wedge r) \wedge (\neg q)$

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

17) Willis is a good teacher
and his students love
math.

23) It is not the case that Carla
is a good teacher or Carla's
students hate math.

OR Carla is a bad teacher
and Carla's students love &
math. (DeMorgan's Law)

24) It is not the case that
Willis is a good teacher
and Willis' students hate
math.

OR Willis is a bad teacher
or Willis' students love
math.

25) p : "Polly sings well" T
 q : "Quentin writes well" F
 r : "Rita is good at math" T

$p \wedge q$ (F)
T F

28) $(\neg p) \vee (\neg q)$
F V T
(T)

$p \quad \neg p \quad q \quad \neg q$
T F F T

29) $(p \wedge \neg q) \vee r$
(T \wedge T) V T
T V T
(T)

$p \quad \neg q \quad r$
T T T

Use
truth
table for
 $p \Rightarrow q$ { 33) T
36) T
41) T
42) T

49) $p \wedge (\neg q)$

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

55) $(p \wedge q) \wedge r$

p	q	r	$p \wedge q$	$(p \wedge q) \wedge r$
T	T	T	T	T
T	T	F	T	F
T	F	T	F	F
T	F	F	F	F
F	T	T	F	F
F	T	F	F	F
F	F	T	F	F
F	F	F	F	F

56) $p \wedge (q \wedge r)$

p	q	r	$q \wedge r$	$p \wedge (q \wedge r)$
T	T	T	T	T
T	T	F	F	F
T	F	T	F	F
T	F	F	F	F
F	T	T	T	F
F	T	F	F	F
F	F	T	F	F
F	F	F	F	F

$$57) p \wedge (q \vee r)$$







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

$$60) (p \vee q) \Rightarrow \neg p$$

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

Fibonacci's Rabbits

Month Number of Pairs

1	1		
2	1		
3	2		$1+1=2$
4	3		$1+2=3$
5	5		$2+3=5$
6	8		$3+5=8$
7	13		
8	21		
9	34		
10	55		
11	89		
12			

Pairs in an orange box represent two month old bunnies, which produce a new pair of bunnies each month.

Notice the pattern, starting with month 3, the number of pairs is the sum of the numbers in the previous two months.

If we want to know the number for month n , say F_n , then

the formula is $F_n = F_{n-1} + F_{n-2}$.

This is called the recurrence relation.