

1) (4 points each) Determine if the following are statements. If not, explain why not.

a) Most people prefer Candidate A.

b) Watch out for that car!

statements  
can be true  
or false

not a statement.

It's an exclamation.

2) (4 points each) Rewrite the following compound statements using  $p, q, r, \wedge, \vee, \neg$ , and  $\rightarrow$  as needed. Be sure to declare what the letters  $p, q$ , and  $r$  represent. Do not allow any connectors into your definitions of  $p, q$ , and  $r$ :

a) She learned the game and plays it every day.

$p$  = she learned the game

$q$  = she plays it every day.

$$p \wedge q$$

b) If we don't go to the store, then I'll either stay or I'll go to the park.

$p$  = we go to the store

$q$  = I'll either stay

$r$  = I'll go to the park

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

3) (5 points each) Let  $p$  = "I like that show." and  $q$  = "I have time to watch it." Translate the following into words:

a)  $\sim p$

I do not  
like that show.

b)  $p \wedge \sim q$

I like that show and  
I do not have time to  
watch it.

4) (5 points) Let  $p$  and  $r$  be true statements and let  $q$  be a false statement. Show the work to determine the truth value of the compound statement:  $(p \wedge \sim q) \rightarrow r$ .

$$(T \wedge \sim F) \rightarrow T$$

$$(T \wedge T) \rightarrow T$$

$$T \rightarrow T$$

$$T$$

5) (5 points each) Negate the following statements:

↓  
"

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# 5pt each

a) I am going to make him an offer he can't refuse.

I am not going to make him an offer he can't refuse.

b) You either die a hero or live long enough to see yourself become the villain

You don't die a hero and you don't live long enough to see yourself become the villain.

c) If you let my daughter go now, that'll be the end of it.

You let my daughter go now and it isn't the end of it.

d) All the world's a stage

Some of the world is not a stage.

6) (5 points each) For the statement "If you walk without rhythm, you won't attract the worm." find the converse, inverse, and contrapositive:

Converse:

If you won't attract the worm, then you walk without rhythm.

Inverse:

If you or you walk with rhythm don't walk without rhythm, then you attract the worm.

Contrapositive:

If you attract the worm, then you walked with rhythm.



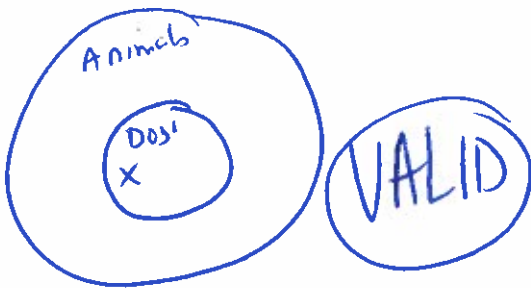
Fun fact: Sandworms run the oldest known book club.

7) (5 points each) Use an Euler diagram to determine whether the argument is valid or invalid:

a) All dogs are animals.

All malamutes are dogs.

All malamutes are animals.

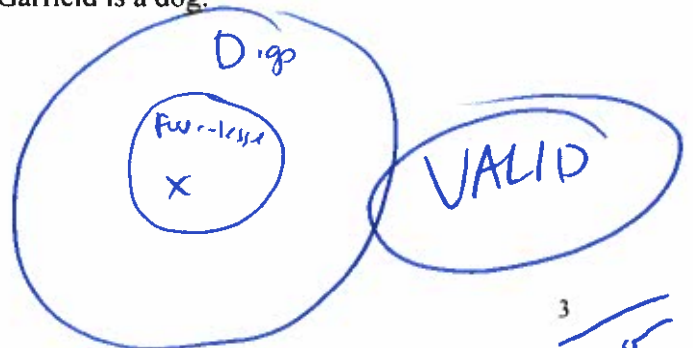


X = malamute

b) All four-legged creatures are dogs.

Garfield has four legs.

Garfield is a dog.



X = Garfield

8) (16 points) Fill in the truth table chart for the statement:  $(p \vee q) \wedge (p \vee \sim r)$ . Be sure to label the column headings.

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

9) (2 points) Is the statement  $(p \vee q) \wedge (p \vee \sim r)$  in number 8 a tautology? Why or why not?

Nope! there were some F's.

10) (8 points) For the following argument...

- a) Rewrite it using  $p, q, r, \wedge, \vee, \sim, \rightarrow$  as needed. Be sure to declare what the letters  $p, q,$  and  $r$  represent.
- b) Write the complete statement that would be the conjunction of the premises implying the conclusion. **Do not construct the truth table.**

If you have allergies, then you have a fish.  
If you do not have a fish, then you have a cat.  
 If you have a cat, then you do not have allergies.

$p$  = you have allergies  
 $q$  = you have a fish  
 $r$  = you have a cat

a)

$$\begin{array}{l} p \rightarrow q \\ \sim q \rightarrow r \\ \hline r \rightarrow \sim p \end{array}$$

b)  $[(p \rightarrow q) \wedge (\sim q \rightarrow r)] \rightarrow (r \rightarrow \sim p)$