

1) (5 points each) Determine if the following are statements. If not, explain why not.

a) Did you buy that toaster?

No - asks a question.

b) The Nintendo Switch is the company's fastest selling system.

Statement.

2) (5 points each) Rewrite the following compound statements using p , q , \wedge , \vee , \sim , and \rightarrow as needed. Be sure to declare what the letters p , and q represent:

a) His favorite color is green and he does not like that movie.

p = His favorite color is green

q = He likes that movie

$p \wedge \sim q$

b) All tacos are sandwiches.

p = it is a taco

q = it is a sandwich

$p \rightarrow q$

3) (5 points each) Let p = "Jeremiah was a bullfrog" and q = "Jeremiah was a good friend of mine". Translate the following into words:

a) $p \rightarrow \sim q$

If Jeremiah was a bullfrog then he was not a good friend of mine.

b) $\sim p \vee \sim q$

Jeremiah was not a bullfrog or Jeremiah was not a good friend of mine.

4) (6 points each) Let p and r be true statements and let q be a false statement. Show the work to determine the truth value of the given compound statement:

a) $\sim(p \wedge q)$

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

$$\sim(F)$$

$$\textcircled{T}$$

b) $(p \vee q) \leftrightarrow r$

$$(T \vee F) \leftrightarrow T$$

$\underbrace{\hspace{2cm}}$

$$T \leftrightarrow T$$

$$\textcircled{T}$$

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

a) I fell into a burning ring of fire.

I did not fall
into a burning
ring of fire.

b) If you like it then you should put a ring on it.

You like it and you should
not put a ring on it.

c) The sun is in my heart and I'm ready for love.

The sun is not in my heart
or I'm not ready for love.

d) Some of them want to use you.

None of them want
to use you.

6) (3 points each) For the statement "If you are here, then you are family.", find the converse, inverse, and contrapositive:

Converse: If you are family, then you are here.

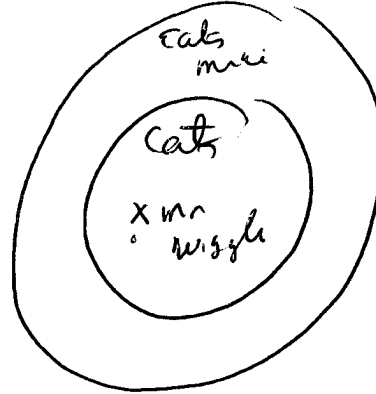
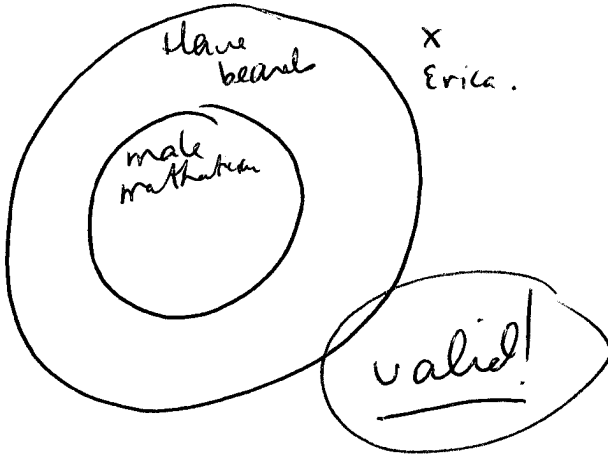
Inverse: If you are not here, then you are not family.

Contrapositive: If you are not family, then you are not here.

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

a) All male mathematicians have beards.
Erica does not have a beard.
 Erica is not a male mathematician.

b) All cats eat mice.
Mr. Wiggles is a cat.
 Mr. Wiggles eats mice.



8) (15 points) Use a truth table to determine whether the argument is valid: $p \rightarrow q$, $q \rightarrow r$, $\sim r \rightarrow \sim p$. Be sure to label the columns!

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

9) (One point per song) Extra credit: Give either the name of the song or the artist in 5¢.



VALID!

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