Elementary Logic
(Philosophy 1006)
Problem Set #1

Name: _____Model Student_____

Student ID:_____

Faculty: _____

email: _____

Mark: __100___ %

Due 14 October 2005 by 4:45PM.

Submit your problem set to Ms. Loletta Li in the Main Building room 302.
(If she is not available, go to room 312, the Philosophy department General Office.)
Make sure your problem set is **timestamped**. Do not submit assignments by email.
Late penalty: 10% for each day late.
This problem set will not be accepted after October 20.

Answer the questions on the problem set itself. Write neatly.
If the grader cannot read your handwriting, you will not receive credit.

Be sure that all pages of the assignment are securely stapled together.

Check the course bulletin board for announcements about the assignment.

Do your own work. If you copy your problem set, or permit others to copy,
you may fail course.

Question 1 (10 marks)

True or false?
Circle "T" if the statement is true and circle "F" if the statement is false.

T F Logic is a science which tells us how people actually reason.
F

T F Sentential logic is an example of an informal system of logic.
F Sentential logic is a formal system of logic.

T F Logic helps us distinguish good reasoning from bad reasoning.
T

T F "I am happy" is a syntactically ambiguous sentence.
F

T F The premises and conclusion of an invalid argument can all be true.
T

T F The premises and conclusion of a valid argument can all be false.
T

T F No valid argument has true premises and a false conclusion.
T

T F The premises and conclusion of a sound argument can all be false.
F

T F The antecedent of "((A→B) → C)" is "(A → B)".
T

T F The main connective of "((A→B) & C)" is "→".
F The main connective is "&".

10/10

Question 2 (10 marks)

Which of the following are statements?
Draw a circle around each statement in the following list:

Where have all the flowers gone?
No. This is a question not a statement.
I'm sorry.
Yes.
Save the last dance for me.
No. This is an imperative sentence.
You were on my mind.
Yes.
Everybody loves a clown.
Yes.
Love is is is strange.
No, not a sentence.
I'm a believer.
Yes.
San Francisco
No, not a sentence.
Tell Laura I love her.
No. This is an imperative sentence.
When I was young.
No, not a sentence.
Both sides now.
No, not a sentence.
You don't own me.
Yes

10 /10

Question 3 (10 marks)

Which of the following are valid arguments?
Circle "Yes" if it is an argument which is valid. Circle "No" otherwise.

Yes No All humans are rich.
Mr. Ho is a human.
Therefore, Mr. Ho is rich.

Yes

Yes No Bangkok is the capital of Thailand.
No. This is a single statement, not an argument.

Yes No Smoking can cause cancer.
Socrates often smokes.
So, Socrates will get cancer.
No. This is an argument but it is not valid. The premises can be true even if Socrates will not get cancer.

Yes No If Plato sees Aristotle, he will be happy.
Plato is happy.
So, Plato saw Aristotle.
No. This is an argument but it is not valid. The premises can be true even if Plato did not see Aristotle.

Yes No 7 is a prime number.
Therefore, there is no largest prime number.
Yes. It is impossible for this conclusion to be false. So it is impossible for the premise to be true while the conclusion is false.

/10

Question 4 (15 marks)

Give your own example of each of the following.
If no example exists, write "No example exists".
Do not use an example that someone else created.

a. A valid argument with 2 true premises, 1 false premise, and a true conclusion.

There are many possible examples.
You needed to make sure that your valid argument
was one which clearly has 2 true premises and a true conclusion.

Example:

London is a city and Shanghai is a city. (T)
Paris is a city. (T)
New Zealand is a city. (F)
So, Shanghai is a city. (T)

b. A sound argument with at least 5 premises.

There are many possible examples.
You needed to make sure that your valid argument
clearly has true premises.

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c. A sound argument with a false conclusion.

No example exists. If an argument is sound, then the conclusion is true. If the conclusion of an argument is false, then (1) the argument is not valid, or (2) at least one of the premises is false, or both (1) and (2).

d. A valid argument with no conclusion.

No example exists. Every argument has a conclusion.

e. An argument which is valid but not sound.

There are many possible examples. Here is one:

Rome is not a city.
So, Rome is not a city.

15/15

Question 5 (15 marks total)

Find a valid argument, in an article published after 1 August 2005 in an English language newspaper or magazine, which displays one of the valid argument patterns discussed in Topic A03. The valid argument patterns in Topic A03 include modus ponens, modus tollens, hypothetical syllogism, disjunctive syllogism, dilemma, and reductio ad absurdum.

Do not choose the same article as anyone else in the course.
If you choose the same article, you will receive no credit for this question.

Answers varied for this question.

a. (3 marks) Attach a copy of the article to this assignment. Draw a circle around the argument you chose.

b. (3 marks) Which valid argument pattern does the argument display?

c. (9 marks) Write down the argument in the standard format.
The argument may have some hidden premises. If it does,
be sure to indicate the hidden premises.

15/15

Question 6 (5 marks)

Circle each of the following expressions which is **not** a WFF of SL:

(A&B&A)

No, not a WFF.

(~A→B)

Yes, a WFF.

A

Yes.

((AvB)↔~(A&C)))

Not a WFF. There are too many parentheses.

~B

Yes.

5 /5

Question 7 (10 marks)

a. How many WFFs of SL are there which contain exactly 7 symbols but do not contain the symbol "~"?

0. There are WFFS with 5 symbols (like "(A v A)") and 9 symbols (like "((A v A) v A)") but none with 7 symbols, if "~" is not present.

b. How many expressions of SL are there which contain no more than 5 symbols and no sentence letter other than "A" or "B"?

Apart from sentence letters, SL has 7 symbols: "~", "v", "&", "→", "↔", "(", ")".

Together with "A" and "B", that makes 9 symbols. So the total number of SL expressions with no more than 5 symbols is:

9 + (9*9) + (9*9*9) + (9*9*9*9) + (9*9*9*9*9)

c. Write an expression of SL which contains every connective of SL.

Many possible correct answers. Here is one:

~v&↔→

(The question asks for an expression, so you need not write a WFF.)

d. Write a WFF of SL which is a disjunction, where one disjunct is a conditional, and the other disjunct is a biconditional.

Many possible correct answers. Here is one:

((A↔A) v (A→B))

e. Write a WFF of SL which contains exactly 11 symbols and no sentence letter other than "A".

Many possible correct answers. Here is one:

~~~~~~~~~~A

10 /10

Question 8 (10 marks)

Make a truth table for each of the following WFFs of SL.

a. (A & ~A)

A	(A & ~ A)
T	T F F T
F	F F T F

b. ((AvC)→~(B&A))

A	B	C	((A v C) → ~ (B & A))
T	T	T	T T T F F T T T
T	T	F	T T F F F T T T
T	F	T	T T T T T F F T
T	F	F	T T F T T F F T
F	T	T	F T T T T T F F
F	T	F	F F F T T T F F
F	F	T	F T T T T F F F
F	F	F	F F F T T F F F

c. ((A&B)↔(AvB))

A	B	((A & B) ↔ (A v B))
T	T	T T T T T T T
T	F	T F F F T T F
F	T	F F T F F T T
F	F	F F F T F F F

d. (((A→B)v(A→C))→(BvC))

A	B	C	(((A → B) v (A → C)) → (B v C))
T	T	T	T T T T T T T T T T T
T	T	F	T T T T T T F F T T T F
T	F	T	T F F T T T T T F T T
T	F	F	T F F F T F F T F F F
F	T	T	F T T T F T T T T T T
F	T	F	F T T T F T F T T T F
F	F	T	F T F T F T T T F T T
F	F	F	F T F T F T F F F F F

e. ((A&~A)→(Bv(CvD)))

A	B	C	D	((A & ~ A) → (B v (C v D)))
T	T	T	T	T F F T T T T T T T
T	T	T	F	T F F T T T T T T F
T	T	F	T	T F F T T T T F T T
T	T	F	F	T F F T T T T F F F
T	F	T	T	T F F T T F T T T T
T	F	T	F	T F F T T F T T T F
T	F	F	T	T F F T T F T F T T
T	F	F	F	T F F T T F F F F F
F	T	T	T	F F T F T T T T T T
F	T	T	F	F F T F T T T T T F
F	T	F	T	F F T F T T T F T T
F	T	F	F	F F T F T T T F F F
F	F	T	T	F F T F T F T T T T
F	F	T	F	F F T F T F T T T F
F	F	F	T	F F T F T F T F T T
F	F	F	F	F F T F T F F F F F

10 /10

Question 9 (15 marks)

Make correct truth tables by writing a WFF of SL in each blank region:
There are many possible correct answers for this question.

a.

A	B	**~(A v B)**
T	T	F
T	F	F
F	T	F
F	F	T

b.

A	B	**~(A ↔ B)**
T	T	F
T	F	T
F	T	T
F	F	F

c.

A	B	C	**((A&(~BvC))v(~A&(~B&~C)))**
T	T	T	T
T	T	F	F
T	F	T	T
T	F	F	T
F	T	T	F
F	T	F	F
F	F	T	F
F	F	F	T

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d.

A	B	C	**((~A&B)v(A&(~B&C)))**
T	T	T	F
T	T	F	F
T	F	T	T
T	F	F	F
F	T	T	T
F	T	F	T
F	F	T	F
F	F	F	F

e.

A	B	C	D	**((((A&(B&(CvD)))v(A&(~B&~C)))v(~A&(B&(C&D))))v(~A&(~B&(CvD))))**
T	T	T	T	T
T	T	T	F	T
T	T	F	T	T
T	T	F	F	F
T	F	T	T	F
T	F	T	F	F
T	F	F	T	T
T	F	F	F	T
F	T	T	T	T
F	T	T	F	F
F	T	F	T	F
F	T	F	F	F
F	F	T	T	T
F	F	T	F	T
F	F	F	T	T
F	F	F	F	F

15 /15