

Problem Set 1: PHIL 1068 Elementary Logic **DUE 4:00PM 6 February 2012**

Student ID Number \_\_\_\_\_ Name \_\_\_\_\_

1. (15 marks)

True or false? Circle 'T' if the statement is true. Circle 'F' if the statement is false.

a.

**T F** Some unsound arguments have true conclusions.

b.

**T F** The scope of " $\sim$ " in " $(\sim(R \ \& \ (Q \rightarrow P)) \ \& \ P)$ " is " $(R \ \& \ (Q \rightarrow P))$ "

c.

**T F** " $(\sim(P \vee Q) \rightarrow ((P \vee S) \vee Q))$ " is a disjunction.

d.

**T F** For every expression  $\phi$  of SL, if  $\phi$  has any parentheses, it has an even number of parentheses.

e.

**T F** "The government plans to raise taxes are up for a vote" is syntactically ambiguous.

f.

**T F** No WFF of SL is both a conjunction and a biconditional.

g.

**T F** Whenever " $(P \vee Q)$ " is false, " $Q$ " is false

h.

**T F** An argument is valid if and only if every logically possible situation in which all the premises are true is also a situation in which the conclusion is true.

i.

**T F** "John has been cooking since we got here early this morning." is an argument.

j.

**T F** The first conjunct of " $(\sim P \ \& \ P)$ " is " $\sim P$ "

k.

**T F** If  $\sim\phi$  is a WFF of SL, then  $\phi$  is a WFF of SL.

l.

**T F** If  $\phi$  is a WFF of SL, then  $\sim\phi$  is a WFF of SL.

m.

**T F** "We should go to the movies tonight!" is a statement.

n.

**T F** The reason logic is topic-neutral is that the principles of logic do not depend on particular accidental features of the world.

o.

**T F** There are an infinite number of WFFs of SL.

2. (10 marks) Which of the following is a valid argument?

Circle “**Yes**” if it is a valid argument. Circle “**No**” if it is not a valid argument.

a.

**Yes No** (Premise) The last 999 hamburgers I ate at McDonald’s all made me sick.  
(Conclusion) The next hamburger I eat at McDonald’s will make me sick.

b.

**Yes No** (Premise) We should go to the peak if it does not rain.  
(Premise) We should go to the peak.  
(Conclusion) So, it does not rain.

c.

**Yes No** (Premise) Either the butler is the murderer or the gardener is the murderer.  
(Premise) The butler is not the murderer.  
(Conclusion) Therefore, the gardener is the murderer.

d.

**Yes No** (Premise) Logic is difficult.  
(Conclusion) Therefore, logic is difficult.

e.

**Yes No** (Premise) Pigs can fly.  
(Conclusion) So,  $2 + 2 = 4$

3. (4 marks) Which of the following five expressions are not WFFs of SL? (Circle all that are not WFFs.)

a.  $\sim((P \ \& \ Q) \rightarrow \sim(\sim R))$

b.  $\sim\sim(\sim\sim P \ \& \ \sim\sim\sim Q)$

c.  $(\sim(P \vee R) \vee \sim(R \vee S))$

d.  $(R \ \& \ (P \rightarrow (S \leftrightarrow (Q \vee (P \ \& \ P))))))$

e.  $(\sim R \leftrightarrow \sim S \leftrightarrow \sim P)$

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4. 4. (16 marks)

Fill in the blanks with an SL WFF to make correct truth tables.

Each WFF must contain exactly three two-place connectives.

a.

<b>P</b>	<b>Q</b>	<b>R</b>	
T	T	T	T
T	T	F	T
T	F	T	T
T	F	F	F
F	T	T	T
F	T	F	F
F	F	T	T
F	F	F	F

b.

<b>P</b>	<b>Q</b>	<b>R</b>	
T	T	T	T
T	T	F	T
T	F	T	T
T	F	F	T
F	T	T	F
F	T	F	T
F	F	T	T
F	F	F	T

c.

<b>P</b>	<b>Q</b>	
T	T	F
T	F	T
F	T	T
F	F	F

d.

<b>P</b>	<b>Q</b>	
T	T	T
T	F	T
F	T	T
F	F	T

5. (15 marks) Make a correct truth table for each of the following WFFs of SL.

a.  $(R \ \& \ (P \leftrightarrow Q))$

b.  $((R \vee \sim Q) \ \& \ \sim\sim P)$

c.  $((Q \ \& \ R) \rightarrow (\sim R \vee P))$

d.  $(\sim(P \rightarrow Q) \leftrightarrow \sim(\sim Q \ \& \ P))$

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e.  $(P \rightarrow (Q \rightarrow (P \rightarrow P)))$