Name_____**ID** _____

Activity 02-1 (8 Jul 2021)

1. Predicates (from wikibook https://en.wikibooks.org/wiki/Discrete_Mathematics/Logic/Exercises#Logic_Exercise_5)

The following predicates are defined:

- friend(x) is "x is a friend of mine"
- wealthy(x) is "x is wealthy"
- clever(x) is "x is clever"
- boring(x) is "x is boring"

With these predicates, you can write "John is clever" as clever(John). Using the predicates defined above, symbolize each of the following.

(a) Some of my friends are clever.	
(b) All clever people are boring.	
(c) None of my friends is wealthy.	
(d) Some of my wealthy friends are clever.	
(e) All my clever friends are boring.	
(f) All clever people are either boring or wealthy.	

Activity 02-2 (8 Jul 2021)
Quantifiers

2. Consider the universe to be "everything." For each of these statements, define appropriate predicates can rewrite the statement using the defined predicates and quantifiers. (Some predicate may have more than one variables)

Statements (and your answers)	Define your predicates here.
1 If a student works hard, that student will be successful.	
For questions 2 and 3, consider the universe to be a set of all people. 2 Everyone has someone that care about him or her.	
3 There is someone that everyone cares about.	
For questions 4 and 5, consider the universe to be a set of all companies. 4 When the economy is good, any companies can make good profits.	
5 When the economy is bad, only companies that can adapt survive.	

Activity 02-3 (8 Jul 2021)

3. For each quantified proposition you answer in question 2, find its negation and translate the negation back to English.

Notes: *You may need to use a few logical equivalences to complete this questions, for example,* $P \Rightarrow Q \equiv \neg P \vee Q$.

	Negations	in English
1		
2		
3		
4		
5		

Activity 02-4 (8 Jul 2021)

Inference rules

4. Use inference rules and standard logical equivalences (e.g., $A \Rightarrow B \equiv \neg A \vee B$) to show that hypotheses

$P \Rightarrow R$

$Q \Rightarrow R$

leads to the conclusion $(P \vee Q) \Rightarrow R$.

Steps	Reason

Activity 02-5 (8 Jul 2021)

5. Use inference rules and standard logical equivalences to show that hypotheses

$P \Rightarrow Q$

$P \Rightarrow \neg Q$

leads to the conclusion $\neg P$.

Steps	Reason

Activity 02-6 (8 Jul 2021)

6. Using inference rules to argue that if we assume

$\neg P \Rightarrow Q$

$(P \vee R) \Rightarrow \neg S$

$W \Rightarrow S$, and

$\neg Q$

then we can conclude that W is false.

Steps	Reason