Propositional Logic (Sheet 1)

Student Name: ~~████████~~

Exercise 1: Determine if the Statement is a Proposition

For each statement, indicate whether it is a proposition. Write "Proposition" or "Not a proposition" in the space provided.

1. "2 + 2 = 4."
   Answer: _yes_

2. "Close the door."
   Answer: _no_

3. "All birds can fly."
   Answer: _~~yes no~~ pso_

4. "Do you like pizza?"
   Answer: _no_

5. "This sentence is a lie."
   Answer: _~~yes~~ no_

6. "7 is greater than 3."
   Answer: _yes_

7. "If a number is divisible by 6, then it is divisible by 3."
   Answer: _yes_

8. "The square root of 9 is 3."
   Answer: _yes_

9. "For some real number x, $x^2 = -1$."
   Answer: _yes_

10. "x is an even number."
    Answer: _~~yes~~ no_

Exercise 2: Propositional Logic Symbols

11. "R and S."
    Answer: _$R \wedge S$_

12. "If A, then B."
    Answer: _$A \rightarrow B$_

13. "Either M or N."
    Answer: _~~$M \leftrightarrow N$~~ $M \vee N$_

14. "Not Q."
    Answer: _~~$\rightarrow Q$~~ $\sim Q$_

15. "L if and only if M."
    Answer: _$L \leftrightarrow m$_

Section 3: Find the Inverse, Converse, and Contrapositive

Statement 16: If a number is even, then it is divisible by 2.

Inverse: _If a number is even, then it is not divisible by 2._

Converse: _If a number is divisible by 2, then is is a even nu.._

Contrapositive: _If a nu. is not divisible by 2, then it is not a even nu._

Statement 17: If today is Sunday, then the library is closed.

Inverse: _If today is sunday, then the library is not closed_

Converse: _It the library_

Contrapositive: _____

Statement 18: If water reaches 100°C, then it boils.

Inverse: _____

Converse: _____

Contrapositive: _____

Statement 19: If a polygon has three sides, then it is a triangle.

Inverse: _____

Converse: _____

Contrapositive: _____

Statement 20: If an animal is a whale, then it is a mammal.

Inverse: _____

Converse: _____

Contrapositive: _____

Section 4: Translate a Real-Life Scenario into Propositions and Symbols

Question 22:
Scenario:
"If I finish my homework and there is no internet outage, then I will attend the online class. However, if I don't finish my homework or the internet is down, I will email the professor and watch the recorded lecture later."

Step 1: Define each proposition:
- Let H: I finish my homework
- Let I: There is an internet outage
- Let C: I attend the online class
- Let E: I email the professor
- Let R: I watch the recorded lecture later

Step 2: Write the symbolic form of the scenario: