Math 111
Conditional Statements

Name:

Directions: For each statement, identify the hypothesis and the conclusion. Decide if the statement is true or false. If it is false, give a specific counterexample. If it is true, justify using “proof by contradiction.”

(1) Let $L$ and $M$ be lists. If “friendship” is on list $L$ and “friendship” is on list $M$, then $L = M$.

Hypothesis:

Conclusion:

True or False?

Justification:

(2) Let $L$ and $M$ be lists. If 22 is on list $L$ and 22 is not on list $M$, then $L \neq M$.

Hypothesis:

Conclusion:

True or False?

Justification:
Let $X$ and $Y$ be fish. If the outcome of breeding $X$ and then $Y$ is the same as the outcome of breeding $Y$ and then $X$, then either $X$ is a Type $W$ fish or $Y$ is a Type $W$ fish.

**Hypothesis:**

**Conclusion:**

**True or False?**

**Justification:**

Let $X$ and $Y$ be fish. If the outcome of breeding $X$ and then $Y$ is not the same as the outcome of breeding $Y$ and then $X$, then $X$ is not a Type $W$ fish.

**Hypothesis:**

**Conclusion:**

**True or False?**

**Justification:**
(5) Let $A$, $B$, and $C$ be elevator programs. If the concatenation of $A$ then $C$ is equal to the concatenation of $B$ then $C$, then $A = B$.

Hypothesis:

Conclusion:

True or False?

Justification:

(6) Let $A$ and $B$ be elevator programs. If the concatenation of $A$ then $B$ is not equal to the concatenation of $B$ then $A$, then $A$ is not the inverse of $B$.

Hypothesis:

Conclusion:

True or False?

Justification: