Extra Credit Problem

Problem 1

Extra Credit Problem Prove the following logical equivalence:

$$\neg p \rightarrow (q \rightarrow r) \equiv q \rightarrow (p \vee r)$$

Start with the Left Side:

$\neg p \rightarrow (q \rightarrow r)$

$\neg\neg p \vee (q \rightarrow r)$ Conditional Identity

$p \vee (q \rightarrow r)$ Double Negation

$p \vee (\neg q \vee r)$ Conditional Identity

$(p \vee \neg q) \vee r$ Associative Law

$(\neg q \vee p) \vee r$ Associative Law

$\neg q \vee (p \vee r)$ Associative Law

$q \rightarrow (p \vee r)$ Conditional Identity

Since the Left Side and the Right Side are logically equivalent.

$$q \rightarrow (p \vee r) \equiv q \rightarrow (p \vee r)$$

The following statement must also be true.

$$\neg p \rightarrow (q \rightarrow r) \equiv q \rightarrow (p \vee r)$$

$\blacksquare$