Reading Questions 2

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1. The statements P and Q are equivalent if $P \iff Q$.
2. If $P \to Q \to R \to P$ is a true statement then P, Q, and R are equivalent statements.
3. Rewrite the statement "A matrix with determinant 1 is invertible." as an implication.

Section 0.1 Compound Statements (Part 2)

More on Truth Values

P 1. In some cases, proving an equivalent statement may be easier than proving the actual statement. Determine if the following statements are equivalent.

$$\neg(P \vee Q) \iff ((\neg P) \wedge (\neg Q))$$

P 2. Determine if the following statements are equivalent.

$$\neg(P \wedge Q) \iff ((\neg P) \vee (\neg Q))$$

P 3. Use a truth table to show that $\big[(P \to Q) \wedge (Q \to R)\big] \to (P \to R)$.

More Compound Statements

P 4. Math symbols are useful when sketching a proof. Use the symbols $\neg, \to, \forall$ (for all) and $\exists$ (there exists) to transcribe the following statements into logical notation.

1. If $y = 1$, then $xy = x$ for any x.
2. There is no solution to $x^2 = y$ unless $y > 0$.
3. $x < z$ is a necessary condition for $x < y$ and $y < z$.
4. If $x < y$ then for some z such that $z < 0$, $xz > yz$.
5. There is an x such that for every y and z, $xy = xz$.

P 5. Negations are often used to show that a statement is false. Write the negation of the following statement.

$$R : \text{The integer 3 is even.}$$

P 6. Write the contrapositive of the implication $Q \Rightarrow P$ from the previous problem.