Problem 14. As a definition, we say that a function \( f(x) \) is continuous at \( x = a \) if for every \( \epsilon > 0 \), there exists \( \delta > 0 \) such that \( |f(x) - f(a)| < \epsilon \) whenever \( |x - a| < \delta \). In a meaningful way, state what it means for a function \( f \) to not be continuous at the point \( x = a \).

Problem 15. Negate the following statement in a meaningful way.

\[
\text{For every } x \in \mathbb{Q}, \text{ there exists } y \in \mathbb{N} \text{ such that } \sin(xy) = 1 \text{ or } \cos(x + y) = \frac{1}{2}.
\]

Problem 16. Negate each of the following statements in a meaningful way.

i. The product of two rational numbers is rational.

ii. The product of two irrational numbers is irrational.

Problem 17. Determine if each of the statements in the previous problem is true or false, and justify your answer. (\textit{Hint:} Recall that a statement is false if its negation is true.)