1) James and Edith will come.
2) Margaret or David will come.
3) If Jane comes, then Andrew will come too.
4) Charles will come if and only if Katy comes.

- **Negate each statement:**

1) James will not come or Edith will not come. ($\neg A \vee \neg B$)
2) Margaret will not come and David will not come. ($\neg A \wedge \neg B$)
3) Jane will come and Andrew will not come. ($A \wedge \neg B$)
4) Charles will not come if and only if Katy comes. ($\neg A \Leftrightarrow B$)

   Charles will come if and only if Katy does not come. ($A \Leftrightarrow \neg B$)

x + y = 10

Determine, what statement is true:

- $\forall x \in N \, \forall y \in R : x + y = 10$
- $\forall y \in N \, \exists x \in Z : x + y = 10$
- $\exists x \in Z \, \forall y \in N : x + y = 10$
- $\forall x \in Z \, \exists y \in N : x + y = 10$
- $\exists y \in N \, \forall x \in Z : x + y = 10$
- $\exists y \in R \, \exists x \in R : x + y = 10$

x + y = 10

Determine, what statement is true:

- $\forall x \in N \, \forall y \in R : x + y = 10$ ✗
- $\forall y \in N \, \exists x \in Z : x + y = 10$ ✓
- $\exists x \in Z \, \forall y \in N : x + y = 10$ ✗
- $\forall x \in Z \, \exists y \in N : x + y = 10$ ✗
- $\exists y \in N \, \forall x \in Z : x + y = 10$ ✗
- $\exists y \in R \, \exists x \in R : x + y = 10$ ✓

$x \cdot y = 0$

Determine, what statement is true:

- $\forall y \in R \; \exists x \in N : x \cdot y = 0$
- $\exists x \in N \; \forall y \in R : x \cdot y = 0$
- $\forall x \in R \; \exists y \in Z : x \cdot y = 0$
- $\exists y \in Z \; \forall x \in R : x \cdot y = 0$

"If little Peter is well-behaved, he will get a cake."

Now, let's analyze the truth values of the following statements based on the given conditional sentence:

- A) Peter was well-behaved, he got a cake.
- B) Peter was well-behaved, he did not get a cake.
- C) Peter was not well-behaved, he got a cake.
- D) Peter was not well-behaved, he did not get a cake.

"If it rained, then it will be wet outside."

Determine if is it true and create the reverse implication:

- $A \Rightarrow B \rightarrow$ If it rained, then it will be wet outside. ✓
- $B \Rightarrow A \rightarrow$ If it is wet outside, then it rained. ✖

- $\neg B \Rightarrow \neg A \rightarrow$ If it is not wet outside, then it did not rain. ✓ (True, this is the contrapositive = logically equivalent)

"If a street lamp falls, then the world will end."

Determine if is it true and create the reverse implication:

- $A \Rightarrow B$ → If a street lamp falls, then the world will end. ✖
- $B \Rightarrow A$ → If the world ends, then a street lamp will fall. ✓
- $\neg B \Rightarrow \neg A$ → If the world does not end, then the street lamp will not fall. ✖