Homework 4

(a) \( R \) should be a linear ordering because for any \( x, y \in P \) and \( m \in \mathbb{N} \), \( xRy \) is true or \( yRx \) is true. One element is not smaller than the other. \( mRy \) is true or \( uRM \text{ is true (for any two elements chosen in the set.} \)

Also, \( P \) is a partial ordering. Therefore, \( P \) is a linear ordering. 

(b) (i) For \( (a) \), the sentence follows:

For any \( x \) in the set \( X \), there exists an element \( y \) that is also in \( X \)

such that \( y \) is not smaller than \( x \).

A sentence about \( \mathbb{N} \): For any positive integer \( x \), there exists a positive integer \( y \) such that \( y \) is not smaller than \( x \).

A sentence about \( P \): For any population of the United States, there exists a population of the United States such that \( y \) is not smaller than \( x \).

(ii) For \( (b) \), the sentence is

There exists \( y \) in the set \( X \) such that for any \( x \) in the set \( X \), \( y \) is not smaller than \( x \).

A sentence about \( \mathbb{N} \): There exists a positive integer \( y \) that is not smaller than any positive integer \( x \). (\( \star \))

A sentence about \( P \): There exists a population of the US \( y \) such that it is not smaller than any population of the US \( x \).

(iii) \( \star \) is not possible. Suppose that we can find such an integer \( y \).

Then, \( y+1 \) is still a positive integer and \( y+1 > y \), which contradicts with statement that \( y \) is not smaller than any positive integer.

(c) The two sentences are equivalent.
2.5. PQR = \angle 1 + \angle 2 + \angle 3

(i) If the sum of the angles of a polygon is not \( 180 \times (n-2) \), then it's not a triangle.

(ii) If a function doesn't attain its maximum on the interval \( 0 \rightarrow 1 \), then it's not a continuous function on the interval \( [0, 1] \).

(iii) If there is a thing I don't say, I don't mean it.

3.17. Converse

3.13. Compositae

3.14. Negation:

(a) \( \neg (x \rightarrow y) \)

(b) \( \neg (x \land y) \)

(c) \( \neg (x \lor y) \)

3.10. \( x \land 2 = 0 \)

\( x = n \)

3.9. Let \( f \) be a formula in one variable

Universe \( U = \{\)