**Q1**: Find a value of such that the implication

is true. Make sure you justify your choice of *K*, with a proof of the implication for your value of *K*.

By simplifying the expression on the RHS, we get

From this we can see that

To get the required parts of K, we need to analyse the LHS:

By converting those parts to absolute values, we get

Once multiplied, they are

As the inequality is a strict one, we need to choose

in order to satisfy it. By taking as the nearest positive integer, the implication is satisfied, as required.

**Q2**: Let Use the triangle inequality to prove the reverse triangle inequality

The term |x| can be expressed as

According to the triangle inequality, dividing the RHS into two terms, and , we get

which proves one case. By expressing the term |y| as

the triangle equality can be applied to the RHS to get

Because the above inequality can also be expressed as

thus proving the other case. Taking them together, we get

as required.

**Q3**: Show that the function given by

is bounded above.

By using the polynomial estimation lemma, there exist

Define so that for we have

Since the domain of the function is , there are only finitely many natural numbers *n* with

Thus, we can define Then, for any we have so that is bounded above, as required.