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Math 301

HW 5

1. For all integers a, b, c, if

Proof.

If , then there is an integer that .

If , then there is an integer that .

By substitution, . Let which is an integer.

Therefore,

2. For all is even.

Proof.

Case 1: when n is odd, we can express

should be an integer, so it is legal to express:

Case 2: when n is even, we can express

should be an integer, so it is legal to express:

Since all the cases of integer agrees, is even.

3. For all real numbers

Given: if is true, then is also true

Proof.

Thus, as the inequality is true.

4. For all , if is even then either is even or is even.

Proof.

Contrapositive state:

For all , if is odd and is odd then is odd.

Let and

Since is an integer,

let is an integer that

Since the contrapositive state is true, the given statement is also true.

Thus, for all , if is even then either is even or is even.

5. For all integers , if and then

Proof.

There are and that and .

Since the result of is an integer, there is an integer such that

Thus, if and then .

6. For all integers , if then or

Proof.

There exists , such that and and .

for

for

for

#contradiction

Since negative of the given statement is false, the given statement is true.

Thus, if then or