1. **Measure**

**Lengths of Bounded Open Sets**

(10.1) **Definition**: Let bounded open interval in , this means or

Length of denoted by and defined as

(10.2) **Examples:**

1. If , then .
2. If , then .
3. If , then .

(10.3) **Theorem:** If bounded open intervals and , then .

**Proof:** let

Since

.

(10.4) **Theorem:** If bounded open intervals and , then .

**Proof:** by mathematical induction .

When .

Assume that when , then the relation is true , this means

Now, we must prove that the relation is true where

Therefore, the relation is true where

the relation true for all .

(10.5) **Theorem:** If bounded open intervals and , then .

**Proof:** since bounded open interval

If the proof is clear.

If

Let , and let

a family open cover of

Since compact set

Since arbitrary .

(10.6) **Theorem:** If countable family of bounded open intervals .

**Proof:** bounded open interval

(10.7) **Definition**: Let open bounded set in , we have

Where bounded open intervals.

Length of set denoted by and defined as

(10.8) **Theorem**: Let family of all bounded open sets in , then function and we have

1. .
2. .
3. If .
4. If and if .
5. Let sequence of sets in .
6. If .