

## Note 7.3 - Arclength and Surface Area

### 1 Introduction

We use principle of integrations to study two other commonly known notions of sizes: arclength for 1-dimensional curve and surface area for 2-dimensional boundary of a solid formed by revolution.

### 2 Arclength

Infinitesimal elements of curves are line segments. Their lengths are quite easy to express:

The "total length" is then

---

### 3 Surface Area of Revolution

Infinitesimal elements of surfaces of revolution take a bit more work to describe. We start with the case  $y = f(x) = mx$ , whose surface of revolution over  $[a, b]$  is a cone:

For a surface in general, we cut them into infinitely many straight pieces and add them up:

---

## 4 Examples

---

---