

## 1 Calc 2 Basics

### 5.3 Average Value

Integrals are pretty much an infinite amount of Riemann sums. If  $f$  is integrable on  $[a, b]$ , then its average value (or mean) on  $[a, b]$  is  $\frac{1}{b-a} \int_a^b f(x) dx$ .

### 5.5 U-Substitution

5.6

6.1

6.2

## 2 Integral Applications and Sections

8.2

8.3

8.4

8.5

## 3 Sequences, Series, and Tests

8.8

10.1

10.2

10.3

10.4

## 4 Sequences, Series, and Tests cont.

10.5

10.6

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10.8

10.9

## 5 Parametric Curves

10.10

### 6.3 Arc Length

Pythagorean's Theorem can be applied to find the length of a segment  $f(x)$ . If  $ds$  is equal to a single straight segment in  $f(x)$ , then  $dx$  is equal to the horizontal length and  $dy$  is equal to its vertical length.

$$\begin{aligned}(ds)^2 &= (dx)^2 + (dy)^2 \\ \sqrt{(ds)^2} &= \sqrt{(dx)^2 + (dy)^2} \\ ds &= dx \sqrt{(dx)^2 / (dx)^2 + (dy)^2 / (dx)^2} \\ ds &= \sqrt{1 + (dy/dx)^2} dx\end{aligned}\tag{1}$$

By taking the integral of this, you can get the total length of the segment.

$$s = \int_a^b \sqrt{1 + (f'(x))^2} dx \quad (2)$$

**6.4**

**11.1**

**11.2**

## **6 Polar Coordinates**

**11.3**

**11.4**

**11.5**