

Section 6.3

After viewing the lecture videos and reading the textbook, you should be able to answer the following questions:

If f is a smooth function on $[a, b]$, then the **arc length** of $y = f(x)$ from $x = a$ to $x = b$ is

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

Similarly, if $x = g(y)$ is a smooth function on $[c, d]$, then the **arc length** of $x = g(y)$ from $y = c$ to $y = d$ is

$$L = \int_c^d \sqrt{1 + (g'(y))^2} dy$$

1. Set up the integral for the length of the given curves:

- a) $f(x) = x^2$, $2 \leq x \leq 5$
- b) $g(y) = y^2$, $2 \leq y \leq 5$
- c) $x^2 + y^3 = 1$ from $(1,0)$ to $(5, -2\sqrt[3]{3})$