Arc Length

Recall the Distance between two points \((x_3, f(x_3))\) and \((x_4, f(x_4))\):

Approximate Arc Length is . . .

The arc length of the graph of \(y = f(x)\) for \(a \leq x \leq b\): The arclength of the graph of a differentiable function \(y = f(x)\) from \((a, f(a))\) to \((b, f(b))\) is . . .
Ex 1: Find the arc length for the curve given by $f(x) = x^2$ between the points $(1, 1)$ and $(3, 9)$.

Ex 2: Find the arc length of the curve given by $y = x^{3/2}$ from the point $(1, 1)$ to the point $(2, 2\sqrt{2})$.  

Suppose \( x = g(y) \) is differentiable, where \( c \leq y \leq d \). The **arc length** of the graph of \( x = g(y) \) between \((g(c), c)\) and \((g(d), d)\) is . . .

**Surface Area**

Frustum of a Right Circular Cone

- \( r \) = radius of upper base
- \( R \) = radius of lower base
- \( s \) = slant height
- \( h \) = height

Lateral Surface Area = \( \pi(r + R)s \)

\[ = \pi(r + R)\sqrt{(R - r)^2 + h^2} \]

The Surface Area of a **Frustum**: The Approximate Surface Area of the Surface of Revolution:

The **Surface Area of the surface of revolution** The surface area of the surface of revolution obtained by revolving the graph of \( y = f(x) \) for \( a \leq x \leq b \) about a horizontal line or vertical line is

The **surface area** of a surface of revolution formed by revolving the graph of \( x = g(y) \), where \( c \leq y \leq d \), about a horizontal or vertical line is . . .
Ex 3: Find the surface area for the surface formed by revolving the curve given by \( y = \sqrt{1 - x^2} \), where \( 0 \leq x \leq 1/2 \) about the \( x \)-axis.

Ex 4: Now revolve the curve given in Example 3 about the \( y \)-axis and compute the surface area of the resulting surface.