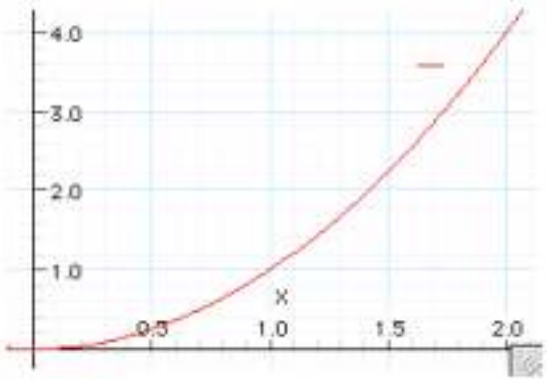
Sec 7.4:
Arc Length

Let's look at how to find the length of a curve. We know how to find the distance between two points if that distance is a straight line - we can use the distance formula. Let's start there and apply it to a curved line between two points.



We wish to approximate the length of the curve $y = x^2$ from x = 0 to x = 2 using 4 lines. Draw the 4 lines and find their lengths and sum them.

0 to .5 Formula _____ Length _____

.5 to 1 Formula _____ Length _____

1 to 1.5 Formula _____ Length _____

1.5 to 2 Formula _____ Length _____

Total Length _____

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

Find the length of the arc on the graph of the function below over the interval [0, 2].

$$y = x^2 + 2x$$

Find the length of the arc on the graph of the function below over the interval [0, 8].

$$(y-1)^3 = x^2$$

Find the length of the graph of the function below from $x = 0$ to $x = \frac{\pi}{4}$

$$f(x) = \ln(\cos x)$$

Let's look at an AP Problem :)

The length of a curve from $x=1$ to $x=4$ is given by the integral below. If the curve contains the point (1,6), find an equation for the curve.

$$\int_1^4 \sqrt{1+9x^4}\,dx$$