Parametric/Vector Curves (Arc Length)

Parametric Functions →

Vectors →

Recall:

Distance =

Sum of n segments $= \displaystyle\sum_{k=1}^{n}$

Sum of infinite # of segments

$$= \sum_{k=1}^{n}$$

Look familiar?

$$= \sum_{k=1}^{n}$$

Length of a Parametric Curve/Vector

Length of a
Parametric/Vector Curve =
  (Arc Length)

Example 1:

Find the length of the parametric curve $x = t^{3/2}$ and $y = 2t - 1$ on $[0,8]$.

Example 2:

A particle moves along a curve so that its position is $(x(t), y(t))$ where $x(t) = t^2 - 4t + 8$ and $\frac{dy}{dt} = te^{t-3} - 1$, where x and y are measured in meters and t is measured in seconds.

a) Find the speed of the particle at $t = 3$.

b) Find the total distance traveled by the particle for $0 \le t \le 4$ seconds.