§8.1–Arc Length

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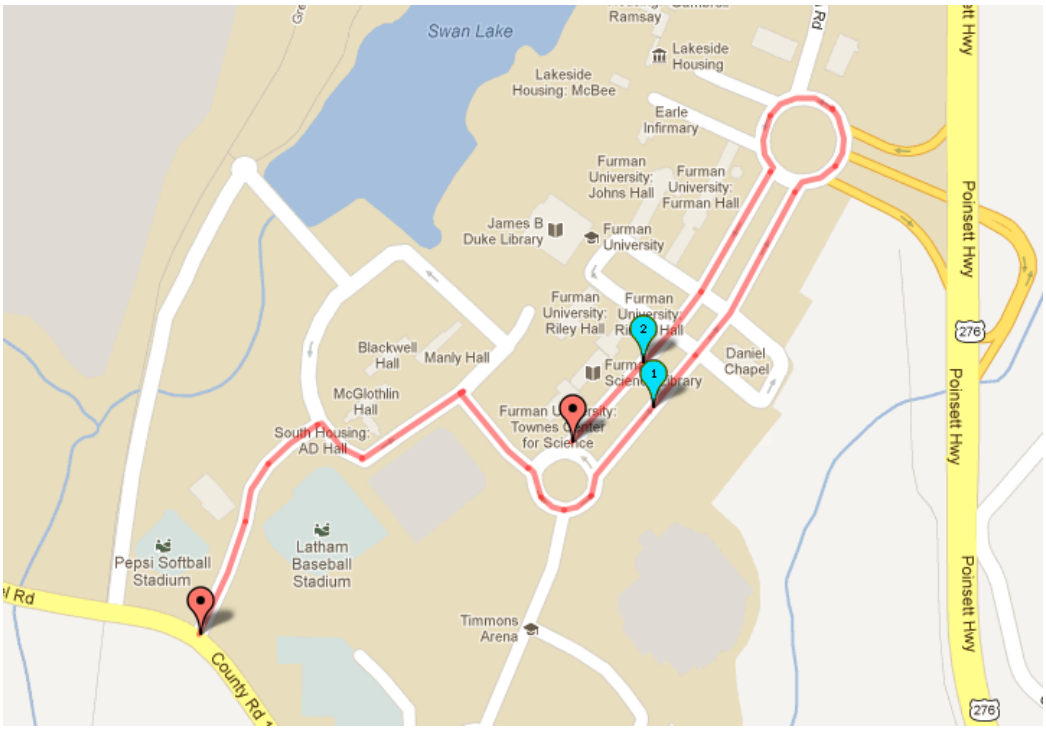
Outline

How to estimate the length of a route



Theorem (Arc length formula)

If f' is continuous on $[a, b]$, then the length of the curve $y = f(x)$, $a \leqslant x \leqslant b$, is

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

Problem

Find the length of the curve $y = x^{3/2}$, $0 \leqslant x \leqslant 44$.

Problem

Find the length of the curve $y = \frac{1}{10}x^5 + \frac{1}{6}x^{-3}$, $1 \leqslant x \leqslant 2$.