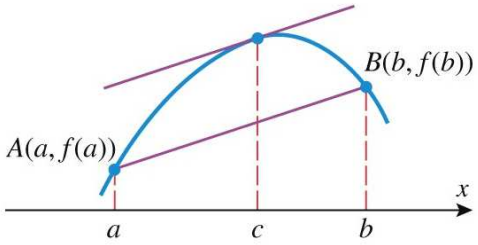
Length of a Curve (Section 6.4)

Warm-up: Find the distance between the given points using The Pythagorean Theorem and then determine the equation of the line that goes through the points:

1. (1, 2) and (2, 4)

2. (0, 0) and (1, 5)

Review: Mean Value Theorem from Chapter 4



Length of a Curve

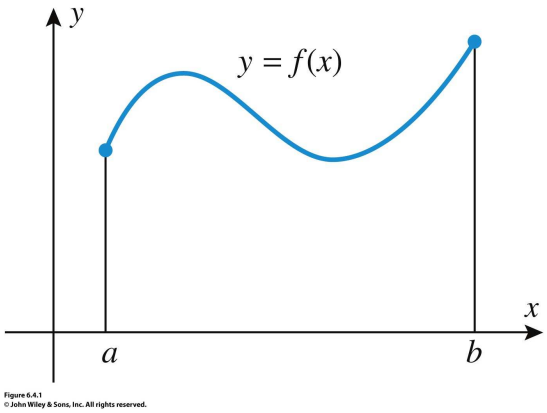


Figure 6.4.1

Formula for Length of a Curve

Example 1: Find the arc length of the curve $y = x^{2/3}$ over [1, 2].

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Class Work

Find the length of the function over the given interval. Then compare your answers to the Warm-up problems.

1. $y = 2x$ over [1, 2]

2. $y = 5x$ over [0, 5]

3. Find the exact length of the curve over the interval: $y = 3x^{3/2} - 1$; [0, 1].

4. Find the exact length of the curve over the interval: $y = 2x^{\frac{3}{2}}$; [0, 2]

Let L be the length of the given curve over the interval. An integral expression for L is: (Set up the integral and simplify, but do not evaluate the integral.)

5. $y = \ln x$ over [1, e]

6. $y = x^{2/3}$ over [1, 8]

7. $y = \sin x$ over $[0, \pi]$