

MA205 - Integral Calculus
Lesson 15: 2D Arc Length

Mechanics Based Problems

1. Find the length of the following curves:

(a) $y = \frac{x^2}{2} - \frac{\ln x}{4}, \quad 2 \leq x \leq 4$

(b) $y = e^x, \quad 0 \leq x \leq 1$

(c) $y = 1 + 6x^{3/2}, \quad 0 \leq x \leq 1$

(d) $x = \frac{1}{3}\sqrt{y}(y - 3), \quad 1 \leq x \leq 9$

Problem Solving Problems

1. A steady wind blows a kite due west. The kite's height above ground from horizontal position $x = 0$ to $x = 80$ ft is given by

$$y = 150 - \frac{1}{40}(x - 50)^2$$

Find the distance traveled by the kite.