

Ans. Key

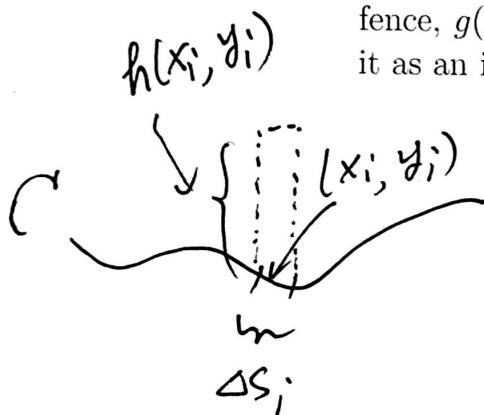
Math 2551 Exercise 19

Section:

Name:

Student ID:

If a fence of non uniform height $h(x, y)$ is built along a smooth curve C on the xy -plane, the cost of per unit side area of the fence is a function of the local height z of the fence, $g(z)$. What is the total cost of the fence? Express it as an integral.



Partition the curve C into segments and look at a representative segment with arc length Δs_i . Pick a pt (x_i, y_i) in it, the ~~the~~ cost of the fence above it is

$$\approx \underbrace{g(h(x_i, y_i))}_{\text{unit cost}} \underbrace{h(x_i, y_i) \Delta s_i}_{\text{side area}}$$

Add them up as the partition gets finer & finer, it converges to $\int_C g(h(x, y)) h(x, y) ds$, if it converges