Mini-Lecture 14.5

The Area Problem; The Integral

Learning Objectives:

1. Approximate the Area Under the Graph of a Function (p. 899)
2. Approximate Integrals Using a Graphing Utility (p. 903)

Examples:

1. The function $f(x) = x^2$ is defined on the interval [1,5]. Graph f. Approximate the area A under f from 1 to 5 by partitioning [1,5] into four subintervals of equal length and choosing u as the left endpoint of each subinterval.

2. The function $f(x) = x^2$ is defined on the interval [1,5]. Graph f. Approximate the area A under f from 1to 5 by partitioning [1,5] into four subintervals of equal length and choosing u as the right endpoint of each subinterval.

Use a graphing utility to approximate the area represented by the integral.

3. $\int_1^2 (-\frac{1}{2}x+3)dx$

4. $\int_0^{\frac{\pi}{4}} \tan x \, dx$

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① $f(x) = x^2$ $[1, 5]$ four subintervals (left), so use 1, 2, 3, 4

$\frac{5-1}{4}$ = length 1

$f(1)(1) + f(2)(1) + f(3)(1) + f(4)(1)$

$1 + 4 + 9 + 16$

30

② $f(x) = x^2$ $[1, 5]$ four subintervals (right), so use 2, 3, 4, 5

$\frac{5-1}{4}$ = length 1

$f(2)(1) + f(3)(1) + f(4)(1) + f(5)(1)$

$4 + 9 + 16 + 25$

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(3) use calculator

2.25

* see video for chp. 14 online

(4) .347 use calculator

* see video for chapter 14 online