Chapter 6: Finding Antiderivative, introduction

Anti-derivative of usual functions

1. Try to find the antiderivatives by the graphs
2. Compute an antiderivative using definite integrals.

Suggested Problems: § 6.1 3,7,9,13, 17,29,31,33

Construct antiderivative analytically

Definition 0.1. We define the general antiderivative family as indefinite integral.

Remark.

$$\int C dx = 0$$

$$\int k dx = kx + C$$

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C, (n \neq -1)$$

$$\int \frac{1}{x} dx = \ln|x| + C$$

$$\int e^x dx = e^x + C$$

$$\int \cos x dx = \sin x + C$$

$$\int \sin x dx = -\cos x + C$$

Properties of antiderivatives:

1. $$\int (f(x) \pm g(x)) dx = \int f(x) dx \pm \int g(x) dx$$

2.

$$\int cf(x)dx = c\int f(x)dx$$

Suggested Problems: § 6.2 51-59, 65,71,75

Second FTC (Construction theorem for Antiderivatives)

Theorem 0.1. If f is a continuous function on an interval, and if a is any number in that interval then the function F defined on the interval as follows is an antiderivative of f:

$$F(x) = \int_a^x f(t)dt$$

Suggested Problems: § 6.4 5,7,9,11,17,27,31-34