

Unit 5: Properties of Definite Integrals
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Definition: $\int_a^b f(x)dx = F(b) - F(a)$

Procedure:

- 1) Find the antiderivative (integrate).
- 2) Evaluate $F(b) - F(a)$. Ignore the constants.
- 3) Simplify.

Examples:

1) $\int_1^5 (3x^2 - 8x + 6)dx$

2) $\int_0^4 (12x + e^x)dx$

3) $\int_0^{\pi/2} \cos x dx$

4) $\int_0^1 5^t dt$

5) $\int_{-1}^3 |x^2 - 1| dx$

Unit 5: Properties of Definite Integrals

I. Addition Property:

$$\text{If } a < b < c, \text{ then } \int_a^c f(x)dx = \int_a^b f(x)dx + \int_b^c f(x)dx$$

II. Coefficient Property:

$$\text{For any Real Number } c, \int_a^b cf(x)dx = c \int_a^b f(x)dx$$

III. Bounds Property:

$$\int_a^b f(x)dx = -\int_b^a f(x)dx$$

IV. Integral Sum/Difference Property:

$$\int_a^b (f(x) \pm g(x))dx = \int_a^b f(x)dx \pm \int_a^b g(x)dx$$

Examples: Using the given and the definite integral properties, solve the following.

1. GIVEN: $\int_0^2 f(x)dx = 5$ and $\int_2^6 f(x)dx = 12$

a) $\int_0^6 f(x)dx =$

b) $\int_6^2 f(x)dx =$

c) $\int_0^2 4f(x)dx =$

d) $\int_6^0 2f(x)dx =$

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2. GIVEN: $\int_1^3 g(x)dx = 8$ and $\int_1^5 g(x)dx = 14$,

a) $\int_3^5 [g(x) - 2]dx =$

b) $\int_3^1 g(x)dx =$

c) $\int_3^1 \frac{1}{2} g(x)dx =$

d) $\int_5^3 -g(x)dx =$

3. GIVEN: $\int_1^4 f(x)dx = 6$ and $\int_1^4 g(x)dx = 3$

a) $\int_1^4 [3f(x) + 7g(x) + 3]dx$

b) $\int_4^1 [2g(x) - f(x)]dx$

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Unit 5 Worksheet 3
AP Calculus AB

Given: $\int_0^1 f(x) dx = 2$ $\int_1^2 f(x) dx = 3$ $\int_0^1 g(x) dx = -1$ $\int_0^2 g(x) dx = 4$
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1. $\int_0^2 f(x) dx =$

2. $\int_0^2 [f(x) + 2g(x)] dx =$

3. $\int_1^2 [g(x) - 1] dx =$

4. $\int_2^0 g(x) dx =$

5. $\int_2^1 3f(x) dx =$

6. $\int_2^1 [g(x) - 2f(x)] dx =$

7. $\int_0^2 [2f(x) - 3g(x)] dx =$

8. $\int_0^1 [2f(x) + 3g(x) - 4] dx =$

9. $\int_1^2 f(x) dx + \int_2^0 f(x) dx =$

10. $\int_1^2 g(x) dx + \int_2^0 g(x) dx =$

HW: pg 371 (#'s 29-35)