Properties of Definite Integrals

PROPERTIES OF THE DEFINITE INTEGRAL.

$$\begin{aligned}
\int_a^b [f(x)+g(x)]\ dx &= \int_a^b f(x)\ dx + \int_a^b g(x)\ dx \\
\int_a^b [f(x)-g(x)]\ dx &= \int_a^b f(x)\ dx - \int_a^b g(x)\ dx \\
\int_a^b c\cdot f(x)\ dx &= c\int_a^b f(x)\ dx \\
\int_a^c f(x)\ dx + \int_c^b f(x)\ dx &= \int_a^b f(x)\ dx \\
\int_a^b f(x)\ dx &= -\int_b^a f(x)\ dx
\end{aligned}$$

If $f(x) \le g(x)$, for all $x \in [a,b]$, then

$$\int_a^b f(x)\ dx \le \int_a^b g(x)\ dx$$

<u>Problem 1</u>. Suppose you know that $f(x) \ge g(x) \ge 0$ for all x, and that $\int_0^2 f(x)\ dx = 4$ and $\int_0^2 g(x)\ dx = 3$. What can you say about the following integrals?

A. $\int_0^2 [2f(x) - g(x)]\ dx$

B. $\int_0^1 f(x)\ dx$

C. $\int_1^2 [f(x) - g(x)]\ dx$

<u>Problem 2</u>. What can you say about the relationship between $\int_1^4 x\ dx$ and $\int_1^4 \ln(x)\ dx$?

Problem 3 Suppose we are given the following information about two functions $f(x)$ and $g(x)$:

$\int_2^5 f(x)\,dx = -6;$ $\int_2^5 g(x)\,dx = 9;$ $\int_{-2}^2 f(x)\,dx = 20.$

Refer to the **Properties Of Definite Integrals** listed in this worksheet to do the following problems.

(a) $\int_2^5 f(x) + g(x)\,dx =$

(b) $\int_2^5 f(x)^2\,dx =$

(c) $\int_2^5 10f(x)\,dx =$

(d) $\int_2^5 f(x) \cdot g(x)\,dx =$

(e) $\int_{-2}^5 f(x)\,dx =$

(f) $\int_5^2 f(x)\,dx =$