§4.3: Finding Area using Geometry
"I WILL …
…find the area through geometry."

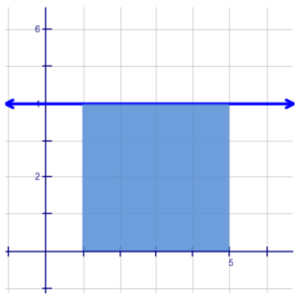
I. Theorem

A. If a function f is continuous on the closed interval, $[a, b]$, then f is integral on $[a, b]$

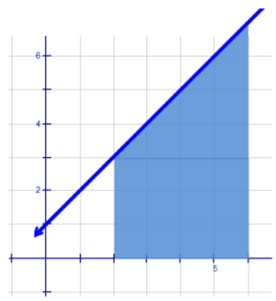
II. Evaluating Definite Integrals

A. Given $\int_a^b f(x)dx$: The Definite Integral represents the ____________ of the Region under the curve, $y = f(x)$, bounded by the x-axis, and the vertical lines $x = a$, and $x = b$

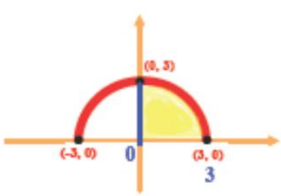
Ex. 1: Set up a Definite Integral for finding the area of the shaded region. Then use integration and geometry to find the area for $f(x) = 4$



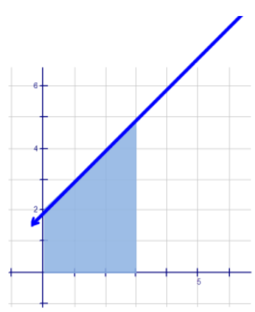
Ex 2: Set up a Definite Integral for finding the area of the shaded region. Then use integration and geometry to find the area for $f(x) = x + 1$



Ex 3: Set up a Definite Integral for finding the area of the shaded region. Then use geometry to find the area for $f(x) = \sqrt{9 - x^2}$



Your Turn: Set up a Definite Integral for finding the area of the shaded region. Then use integration and geometry to find the area for $f(x) = x + 2$ from $x = 0$ to $x = 3$



II. Special Integration Formulas

A. $\int_a^a f(x)\,dx =$ ______, where f is defined as $x = a$

B. $\int_a^b f(x)\,dx =$ ______________, where f is integrable on $[a,\ b]$

C. $\int_a^b f(x)\,dx =$ ___________________________, where f is integrable on the three closed intervals determined by a, b, and c.

D. $\int_a^b kf(x)\,dx =$ _____________________, where k is constant and f and g are integrable

E. $\int_a^b [f(x) \pm g(x)]\,dx =$ ________________________, where f and g are integrable

Ex 4: Solve $\int_2^2 (x+5)\,dx$	Ex 5: Given $\int_0^3 (x+2)\,dx = \frac{21}{2}$, solve $\int_3^0 (x+2)\,dx$
Ex 6: Given $\int_2^5 x^4\,dx = 40$, $\int_2^5 x\,dx = 7$, and $\int_2^5 dx = 3$ evaluate $\int_2^5 (10 - 3x - 2x^4)\,dx$	Your Turn: Given $\int_1^2 x^2\,dx = \frac{7}{3}$ and $\int_1^2 x\,dx = \frac{3}{2}$, evaluate $\int_1^2 3(x^2 + x)\,dx$

Your Turn: If $\int_1^{10} f(x)\,dx = 4$ and $\int_{10}^3 f(x)\,dx = 7$, then $\int_1^3 f(x)\,dx =$

(A) -3 (B) 0 (C) 3 (D) 11

Vocabulary	Process and Connections	Answer and Justifications

Assignment: Page 273: 13-43 odd, 47 A-E