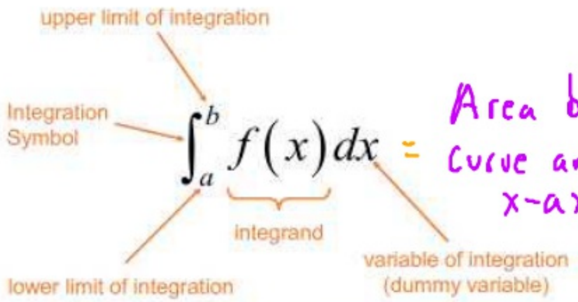
What you'll Learn About

- Terminology and Notation of Integration
- The Definite Integral
- Area under a curve using geometry
- Properties of Definite Integrals

Evaluate the definite integral using geometry

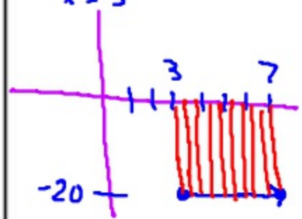


$\int_a^b f(x)\,dx$ = Area between the curve and the x-axis from $x=a$ to $x=b$

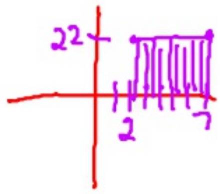
It is called a dummy variable because the answer does not depend on the variable chosen.

$f(x) = -20$

8) $\int_3^7 -20\,dx = 4(-20) = -80$ ($x=7$, $x=3$)



8A) $\int_2^7 22\,dx = (7-2)(22) = 5(22) = 110$



$f(x) = -2x+4$

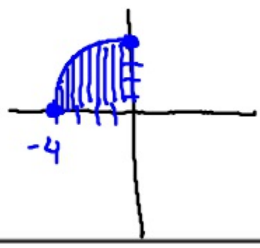
$f(.5) = 3 = b_1$

$f(1.5) = 1 = b_2$

14) $\int_{.5}^{1.5} (-2x+4)\,dx = 2$

16) $\int_{-4}^{0} \sqrt{16-x^2}\,dx = 4\pi$

Circle

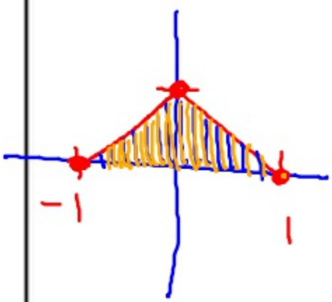


$A = \frac{\pi r^2}{4} = \frac{\pi(4)^2}{4}$

Trapezoid $= \frac{1}{2}h(b_1+b_2)$

$= \frac{1}{2}(1)(3+1) =$

$\int_{1}^{-1} \quad = -1$

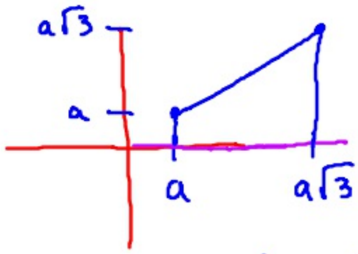


18) $\int_{-1}^{1}(1-|x|)dx = 1$

$A = \frac{1}{2}bh$

$A = \frac{1}{2}(2)(1)$

28) $\int_{a}^{\sqrt{3}a}(x)dx$ $\quad a\sqrt{3}$



$A = \frac{1}{2}(a\sqrt{3}-a)(a+a\sqrt{3})$

$\int_0^0 x\,dx = 0$ $\quad x \quad y$

Graph $f(x)=\frac{1}{2}x^2$ using areas under the curve

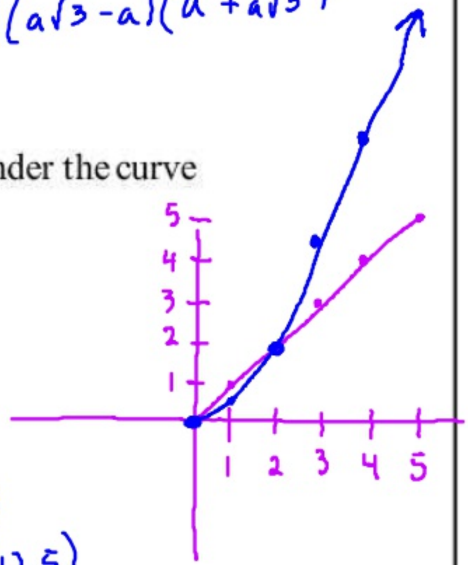
$\int_0^1 x\,dx = \frac{1}{2}(1)(1) = \frac{1}{2}$ $\quad (1, \frac{1}{2})$

$\int_0^2 x\,dx = \frac{1}{2}(2)(2) = 2$ $\quad (2, 2)$

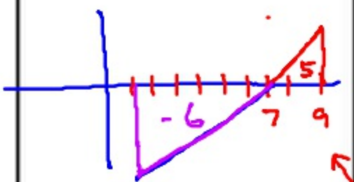
$\int_0^3 x\,dx = \frac{1}{2}(3)(3) = \frac{9}{2}$ $\quad (3, \frac{9}{2})$

$\int_0^4 x\,dx = \frac{1}{2}(4)(4) = 8$ $\quad (4, 8)$

$\int_0^5 x\,dx = \frac{1}{2}(5)(5) = 12.5$ $\quad (5, 12.5)$



Use properties of Definite Integrals to answer the following



$\int_1^9 f(x)dx = -1$

* $\int_1^9 f(x)dx = -1$ | $\int_7^9 f(x)dx = 5$ | $\int_7^9 h(x)dx = 4$

* $a)\int_1^9 -2f(x)dx = -2(-1) = 2$

$b)\int_7^9 [f(x)+h(x)]dx = 5 + 4 = 9$

$\int_7^9 f(x) + \int_7^9 h(x) =$

$c)\int_7^9 [2f(x)-3h(x)]dx = \int_7^9 2f(x) - \int_7^9 3h(x) = 2(5)-3(4)$
$= -2$

$d)\int_9^1 f(x)dx = -\int_1^9 f(x) = 1$

$e)\int_1^7 f(x)dx = \int_1^9 f(x) - \int_7^9 f(x) = -1-5=-6$

$f)\int_9^7 [h(x)-f(x)]dx = -\left[\int_7^9 h(x) - \int_7^9 f(x)\right] = -[4-5] = +1$

$g)\int_9^9 h(x)dx = 0$

Integral of h(x) from x=9 to x=9