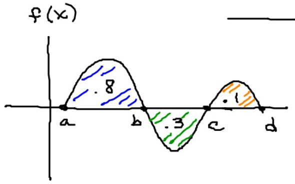
Definite Integrals: $\int_{x_1}^{x_2} f(x)\,dx$ = NET SIGNED AREA BETWEEN f(x) AND THE x-AXIS FROM x_1 TO x_2.



① $\int_a^b f(x)\,dx = .8$

② $\int_c^d f(x)\,dx = .1$

③ $\int_b^c f(x)\,dx = -.3$

④ $\int_a^d f(x)\,dx = .8 - .3 + .1 = .6$

⑤ $\int_b^c 5f(x)\,dx = 5\int_b^c f(x)\,dx = 5(-.3) = -1.5$

⑥ $\int_b^a f(x)\,dx = -.8$

⑦ $\int_c^c f(x)\,dx = 0$

Properties of Definite Integrals: ASSUME $a \le b \le c$

① $\int_a^a f(x)\,dx = 0$

② $\int_a^b k\,f(x)\,dx = k\int_a^b f(x)\,dx$

③ $\int_b^a f(x)\,dx = -\int_a^b f(x)\,dx$

④ $\int_a^b f(x)\,dx + \int_b^c f(x)\,dx = \int_a^c f(x)\,dx$

⑤ $\int_a^b f(x) \pm g(x)\,dx = \int_a^b f(x)\,dx \pm \int_a^b g(x)\,dx$

Examples: LET $\int_1^{10} f(x)\,dx = -5$ $\quad \int_6^{10} f(x)\,dx = 3$ $\quad \int_6^{10} g(x)\,dx = 1$

① $\int_{10}^{1} 4f(x)\,dx = -4(-5) = 20$

② $\int_1^6 f(x)\,dx = \int_1^{10} f(x)\,dx - \int_6^{10} f(x)\,dx$

$= -5 - 3$

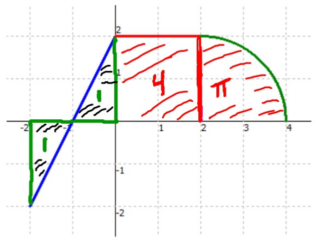
$= -8$

③ $\int_6^{10} 3f(x) - 5g(x)\,dx = 3\int_6^{10} f(x)\,dx - 5\int_6^{10} g(x)\,dx$

$= 3(3) - 5(1)$

$= 4$

Let f(x) be given by the graph:



① $\int_{-2}^{0} f(x)\,dx = -1 + 1 = 0$

② $\int_0^4 f(x)\,dx = 4 + \pi$

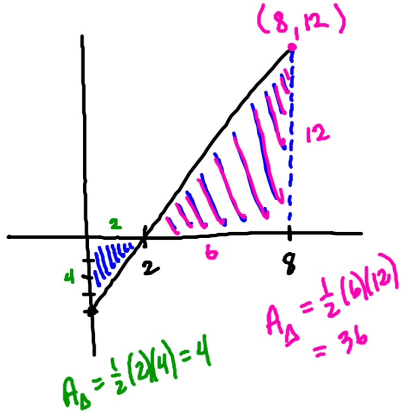
③ $\int_4^2 f(x)\,dx = -\pi$

④ $\int_{-2}^{-1} 3f(x)\,dx = 3\int_{-2}^{-1} f(x)\,dx = 3(-1)$

$= -3$

⑤ $\int_2^0 f(x)\,dx = -4$

$\underline{\underline{Ex}}$: $\int_0^8 2x-4\,dx$



$\int_0^8 2x-4\,dx$

$= \int_0^2 2x-4\,dx + \int_2^8 2x-4\,dx$

$= -4 + 36$

$= \boxed{32}$