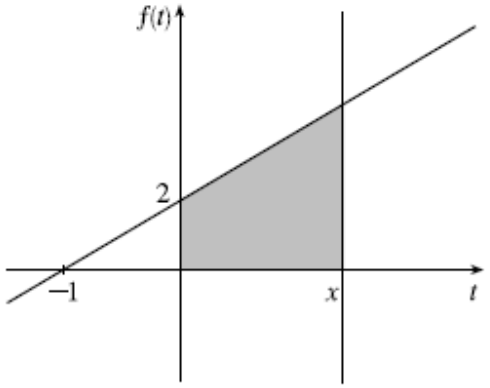
Name_____ **Area Under the Curve** (definite integrals)

1. Let $f(t) = 2t + 2$ for all t.



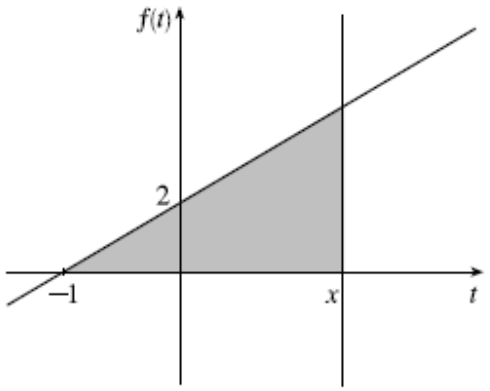
(a) Using geometry, compute $\int_0^2 f(t)\,dt$.

(b) Similarly, compute $\int_0^4 f(t)\,dt$.

(c) Using your answers to parts (a) and (b) as a guide, compute $\int_0^x f(t)\,dt$ for any $x \geq 0$.

(d) We now define another area function $B(x) = \int_0^x f(t)\,dt$. What is $B(2)$? $B(4)$? $B(0)$? Write a general formula for $B(x)$.

(e) We will now define a third area function $C(x) = \int_{-1}^x f(t)\,dt$ for any $x \geq -1$, as pictured below:



What is $C(2)$? $C(4)$? $C(-1)$? Write a general formula for $C(x)$.

2. Let $f(x)$ and $g(x)$ be functions that we know very little about. In fact, all we know is that $\int_1^4 f(x)\,dx = 7$, $\int_2^4 f(x)\,dx = 5$, and $\int_1^4 g(x)\,dx = 2$.
Using only this information, compute the following.

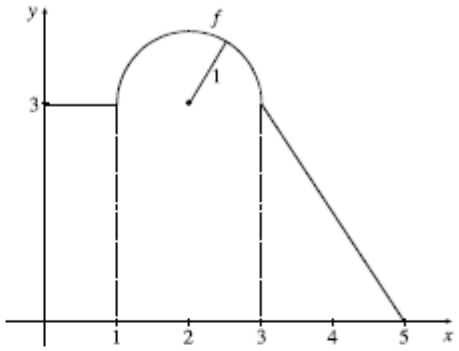
(a) $\int_1^4 4f(x)\,dx$

(b) $\int_1^4 [g(x) - f(x)]\,dx$

(c) $\int_1^4 [8f(x) - 7g(x)]\,dx$

(d) $\int_1^2 [-f(x)]\,dx$

3. Consider this function f:



Compute the following:

(a) $\int_0^2 f(x)\,dx$

(b) $\int_1^3 f(x)\,dx$

(c) $\int_0^4 f(x)\,dx$

(d) $\int_0^5 f(x)\,dx$