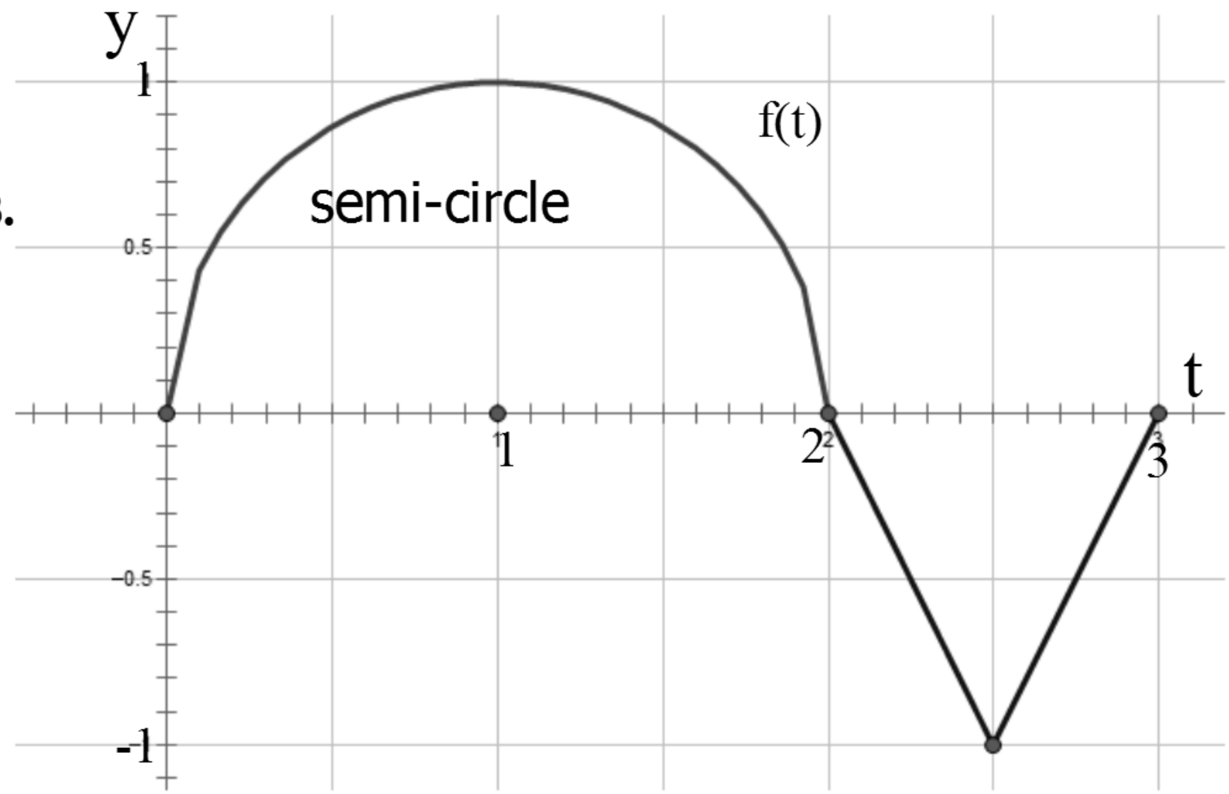
# Warm Up:

If $g(x) = \int_0^x f(t)\,dt$

find g(x) if x = 0, 1, 2, 2.5 and 3.

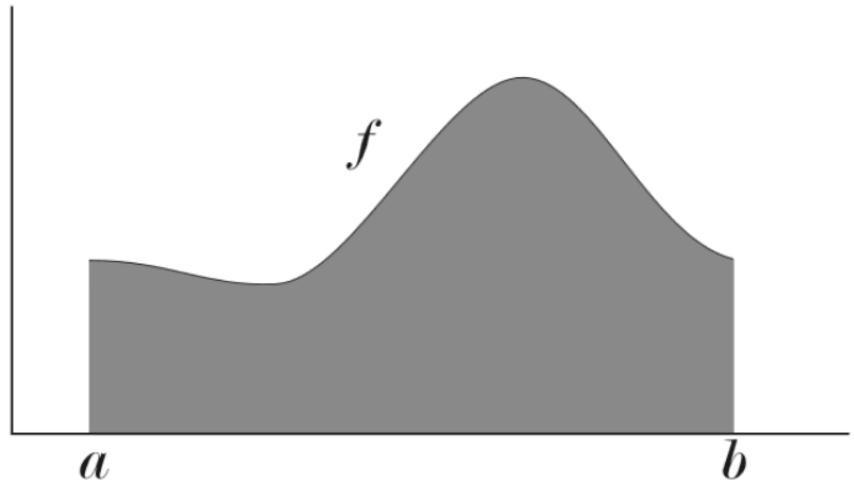



Where does g(x) have a maximum?

Where does g(x) have a minimum?

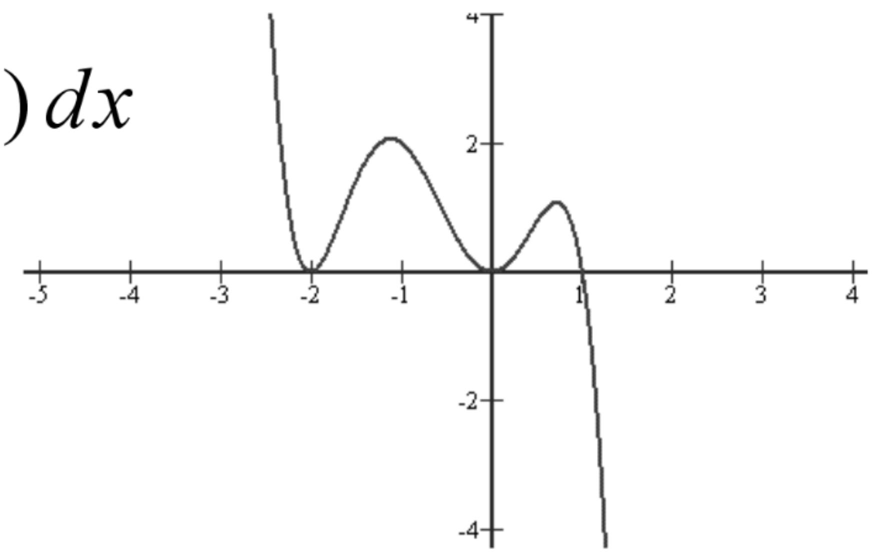
Definite integral: this is a number (the area under the curve)

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




Indefinite integral: this is a function.

$$\int f(x)\,dx$$




1. Which function has f(x) as a derivative?

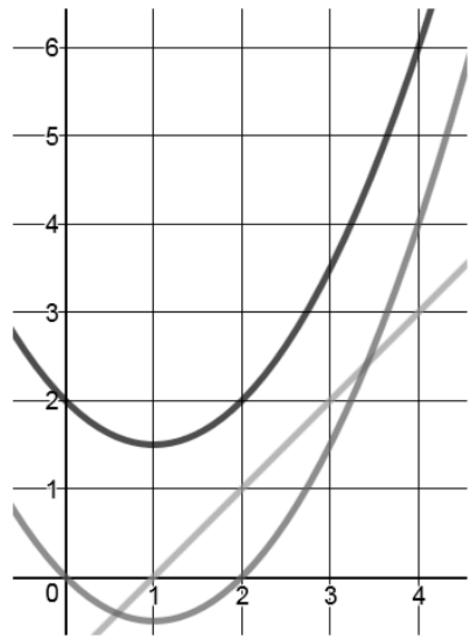
2. $\int f(x)\,dx$ is an area function, that which is bound under f(x).

# Evaluating Indefinite Integrals

Since we don't know the specific value for the y-intercept (or starting value) for an indefinite integral, always identify this by write "+ C" after you find F(x).

ex. $\int (x - 1)\, dx$

$\frac{1}{2}x^2 - x + c$



**ex.** $\int(\theta - \csc\theta\cot\theta)\,d\theta$

[redacted]

[redacted]

Net Change Theorem:
The integral of a rate of change is the net change:

$$\int_a^b F'(x)\,dx = F(b) - F(a)$$

For Example:
consider

$$\int_3^6 3x^2\,dx$$

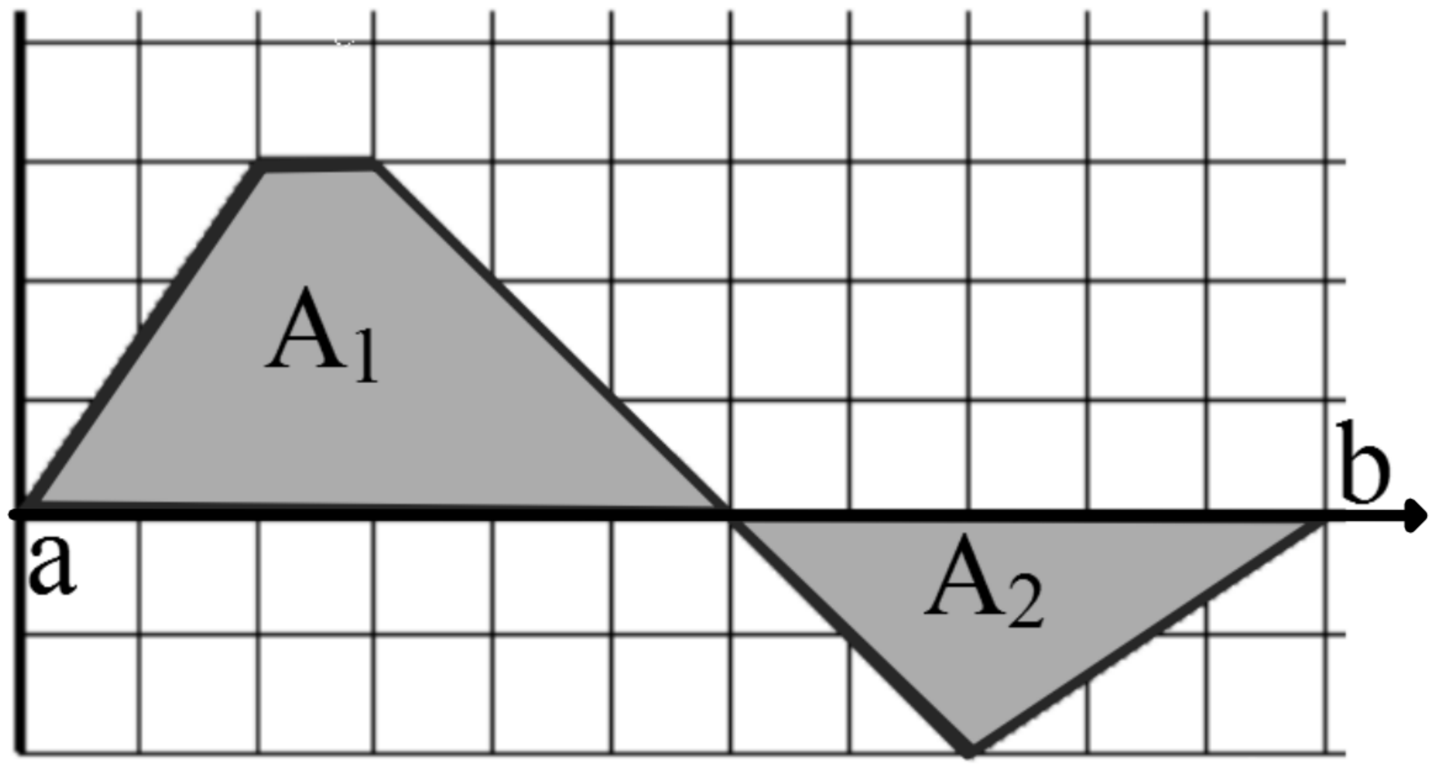
What does this mean if
$v(t)=3x^2$ ?

What does this mean in the area interpretation of the integral?

Note the difference between <u>displacement</u> and <u>distance</u>:

$$\text{Displacement} = \int_a^b v(t)\,dt = A_1 - A_2$$

$$\text{Distance} = \int_a^b |v(t)|\,dt = A_1 + A_2$$



Evaluate all these here integrals

Name:____________________

1. $\int_1^5 \frac{5}{9x}\, dx$

4. $\int_{\pi}^{2\pi} \cos(\theta)\, d\theta$

2. $\int_0^1 \left(1 + \frac{1}{2}u^4 - \frac{2}{5}u^9\right) du$

5. $\int_0^1 \left(3 + x\sqrt{x}\right) dx$

3. $\int_1^8 \sqrt[3]{x}\, dx$

6. $\int_0^{\frac{\pi}{3}} \sec\theta \tan\theta\, d\theta$