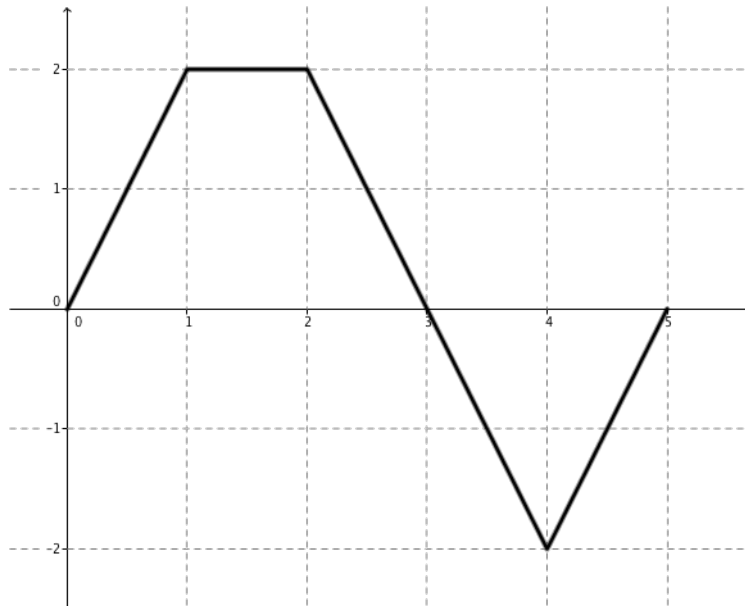


The Fundamental Theorem of Calculus Part 1

A new way to define a function...

Example 1.

If f is the function whose graph is shown below and $g(x) = \int_0^x f(t) dt$, find the values of $g(0)$, $g(1)$, $g(2)$, $g(3)$, $g(4)$, $g(5)$.



The Fundamental Theorem of Calculus: Part 1

If f is continuous on $[a, b]$, then the function g defined by

$$g(x) = \int_a^x f(t) dt \quad a \leq x \leq b$$

is continuous on $[a, b]$ and differentiable on (a, b) , and

$$g'(x) = f(x) \quad a < x < b$$

Example 2.

1. Find the derivative of the function $g(x) = \int_0^x \sqrt{1+t^2} dt$

2. Find the derivative of the function $S(x) = \int_0^x \sin(\pi t^2/2) dt$

Example 3.

1. Find $\frac{d}{dx} \int_1^{x^4} \sec t \, dt$

2. Find the derivative of the function $G(x) = \int_x^1 \cos \sqrt{t} \, dt$

3. Find the derivative of the function $F(x) = \int_{x^2}^{x^4} e^t \, dt$