



## ICE - Calculating Derivatives

Calculate formulas for the first derivatives of the functions given in the table below.

Function	First Derivative
$f(x) = \frac{1}{2}x^2 - x + 1$	
$f(x) = \frac{1}{3}x^3 + \frac{1}{2}x^2 - 2x - 1$	
$f(x) = x^3 + 1$	
$f(x) = \frac{1}{4}x^4 - \frac{1}{2}x^2 - 1$	
$f(x) = \frac{1}{4}x^4 - \frac{1}{3}x^3 - \frac{1}{2}x^2 + x - 1$	
$u(x) = \frac{1 - \sqrt{x}}{9 + 2x^3}$	
$v(t) = \frac{\sqrt[3]{t} - \frac{1}{t}}{2 - 3t^2}$	
$m(z) = (z^2 + 1) \cdot (1 - z - z^2 - z^3)$	

(a)  $f'(x) = x - 1.$

(b)  $f'(x) = x^2 + x - 2.$

(c)  $f'(x) = 3x^2.$

(d)  $f'(x) = x^3 - x.$

(e)  $f'(x) = x^3 - x^2 - x + 1.$

(f) 
$$u'(x) = \frac{\frac{1}{2}x^{-1/2} \cdot (9 + 2x^3) - (1 + \sqrt{x}) \cdot 6x^2}{(9 + 2x^3)^2}.$$

(g) 
$$v'(t) = \frac{\left(\frac{1}{3}t^{-2/3} + \frac{1}{t^2}\right) \cdot (2 - 3t^2) - \left(\sqrt[3]{t} - \frac{1}{t}\right) \cdot (-6t)}{(2 - 3t^2)^2}.$$

(h)  $m'(z) = 2z \cdot (1 - z - z^2 - z^3) + (z^2 + 1) \cdot (-1 - 2z - 3z^2).$