## 3.4 Derivatives as Rates of Change

Displacement          Velocity          Acceleration

$S(t)$          $s'(t) = V(t)$          $s''(t) = V'(t) = a(t)$
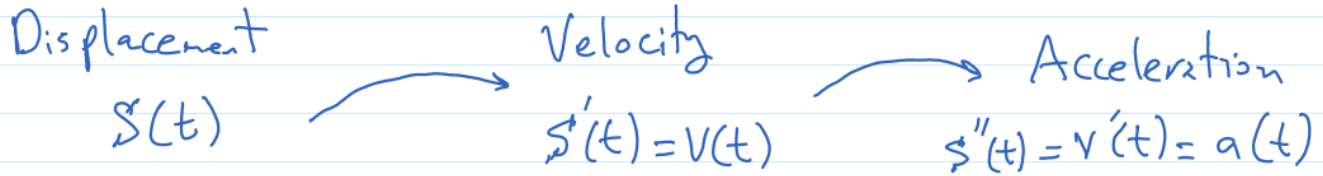
153. A rocket is fired vertically upward from the ground. The distance $s$ in feet that the rocket travels from the ground after $t$ seconds is given by $s(t) = -16t^2 + 560t$.

    a. Find the velocity of the rocket 3 seconds after being fired.

    b. Find the acceleration of the rocket 3 seconds after being fired.

# 3.5 Derivatives of Trigonometric Functions

The derivatives of the remaining trigonometric functions are as follows:

$$\frac{d}{dx}(\tan x) = \sec^2 x$$

$$\frac{d}{dx}(\cot x) = -\csc^2 x$$

$$\frac{d}{dx}(\sec x) = \sec x \tan x$$

$$\frac{d}{dx}(\csc x) = -\csc x \cot x.$$

## 3.6 The Chain Rule

For the following exercises, find $\frac{dy}{dx}$ for each function.

228. $y = \left(3x^2 + 3x - 1\right)^4$

229. $y = \left(5 - 2x\right)^{-2}$

230. $y = \cos^3\left(\pi x\right)$

231. $y = \left(2x^3 - x^2 + 6x + 1\right)^3$

232. $y = \dfrac{1}{\sin^2(x)}$

233. $y = \left(\tan x + \sin x\right)^{-3}$

234. $y = x^2 \cos^4 x$

235. $y = \sin\left(\cos 7x\right)$

236. $y = \sqrt{6 + \sec \pi x^2}$

237. $y = \cot^3\left(4x + 1\right)$