Calculus Formulas

Limit Definitions of a Derivative

The derivative of ***f*** at ***x*** is given by:

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}$$

The derivative of ***f*** at ***c*** is given by:

$$f'(c) = \lim_{x \to c} \frac{f(x) - f(c)}{x - c}$$

Position/Velocity/Acceleration Formulas

If ***s(t)*** gives the position at time ***t*** of an object moving in a straight line, then the ***average velocity*** of the object over the interval **[*t*,*t*+Δ*t*]** is given by:

$$average\ velocity = \frac{\Delta x}{\Delta t} = \frac{s(t + \Delta t) - s(t)}{\Delta t}$$

If ***s=s(t)*** is the position function for an object moving along a straight line, then the ***velocity*** of the object at time ***t*** is given by:

$$v(t) = \lim_{\Delta t \to 0} \frac{s(t + \Delta t) - s(t)}{\Delta t} = s'(t)$$

If ***s*** is the position function for an object moving along a straight line, then the ***acceleration*** of the object at time ***t*** is given by:

$$a(t) = v'(t)$$

Summation of Position/Velocity/Acceleration

$$s(t) = position$$

$$v(t) = velocity = s'(t)$$

$$a(t) = acceleration = v'(t) = s''(t)$$