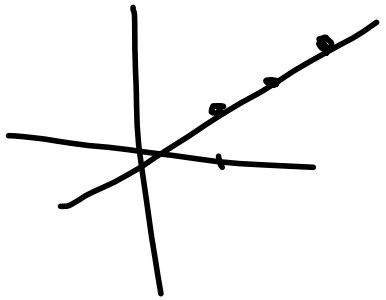
Average Value

1) Recall the average of two values is found by adding up the two values and dividing by two. If the function is linear (i.e. changing at a constant rate) that method works great. But...

$$\bar{y} = \frac{\int_a^b f(x)\,dx}{b-a}$$

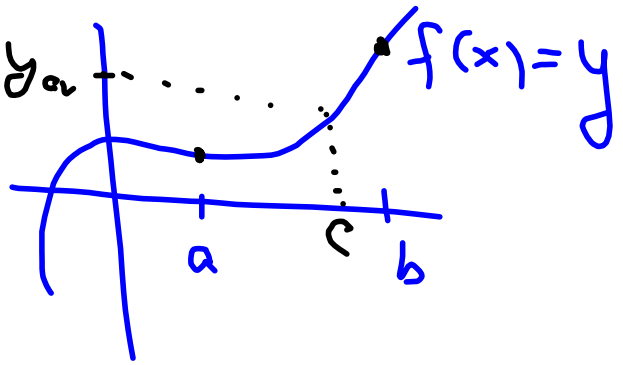


2)

MVT for integrals

If a function is continuous than there is some $x=c$ such that the function existed at $x=c$ for that average value.

$$f(c) = \bar{y} = \frac{\int_a^b f(x)\,dx}{b-a}$$



(3) Recall AP Physics HRW ch2#30. What is the average velocity and average acceleration (part a & b)?

(30)

$x = 2.0t^3$

$v = \frac{dx}{dt} = 6.0t^2$

$a = \frac{d^2x}{dt^2} = 12t$

c) $v\big|_{t=1} = 6t^2\Big|_{t=1} = 6\ \frac{m}{s}$ $\left(\frac{m}{s}\right)$

$v(2s) = 24\ \frac{m}{sec}$

d) $a(1s) = 12\ m/s^2$

$a(2s) = 24\ m/s^2$

a) $\bar{v} = \frac{\int_1^2 v\,dt}{(2-1)\,sec} = \frac{6\ \frac{m}{s^3}\, t^3\Big|_1^2}{1} = 16-2 = 14\ m/s$

b) $\bar{a} = \frac{\int_1^2 a\,dt}{(2-1)\,s} = \frac{\int_1^2 12t\,dt}{1\,sec} = \frac{6t^2\Big|_1^2}{1\,sec} = \frac{24-6}{sec} = 18\ m/s^2$