

4-4 Day 2 Obj:

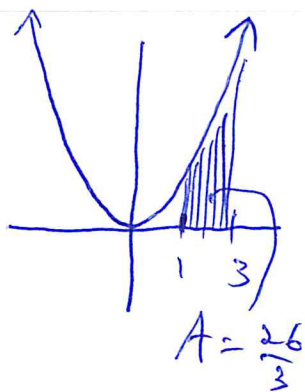
to apply FTC to find average value of $f(x)$ & distance vs position problems.

$$\text{FTC} \quad \underbrace{\int_a^b f(x) dx}_{\text{Area under } f(x)} = \underbrace{F(b) - F(a)}_{\text{Total (Net) change in } F(x), \text{ the anti-derivative, from } a \text{ to } b}$$

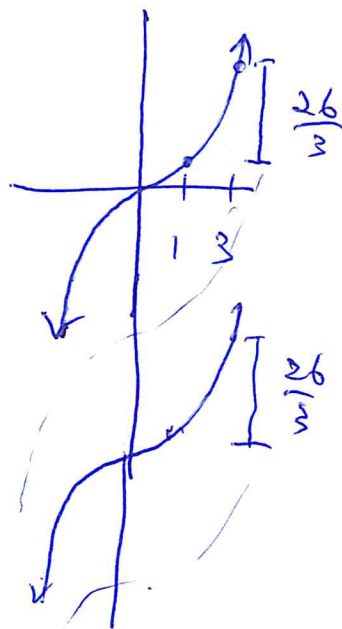
Area under $f(x)$

Total (Net) change in $F(x)$, the anti-derivative, from a to b

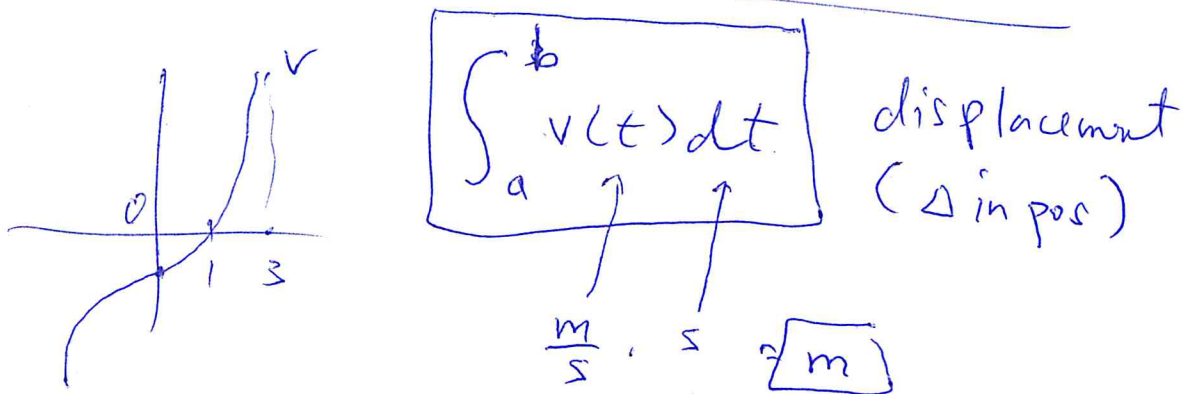
$$\text{Ex:} \quad \int_1^3 x^2 dx = \frac{26}{3}$$



Antiderv. $\frac{1}{3}x^3 + C$



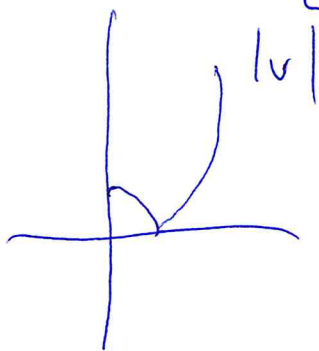
Ex: If $v(t) = t^3 - 1$, find the displacement (i.e. change in position) from $t = 0$ to $t = 3$.



$$\int_0^3 v(t) dt = \boxed{17.25}$$

Ex: Find distance traveled.

$$\int_a^b |v(t)| dt$$



$$D = \int_0^3 |v(t)| dt = \boxed{18.750}$$

Average Value of $f(x)$ from a to b

$$= \frac{1}{b-a} \int_a^b f(x) dx$$