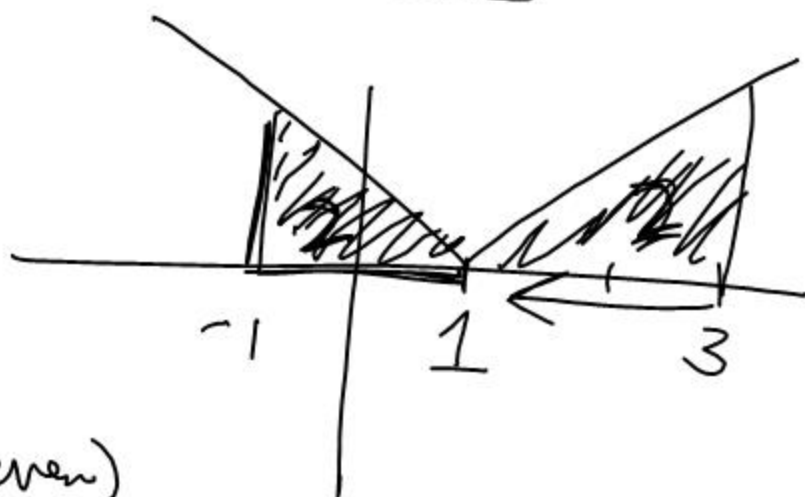


(1e)

$$\int_3^{-1} f(x) dx - \int_3^{-1} |x-1| dx = 10$$
$$+ 6 + \boxed{+ 4}$$

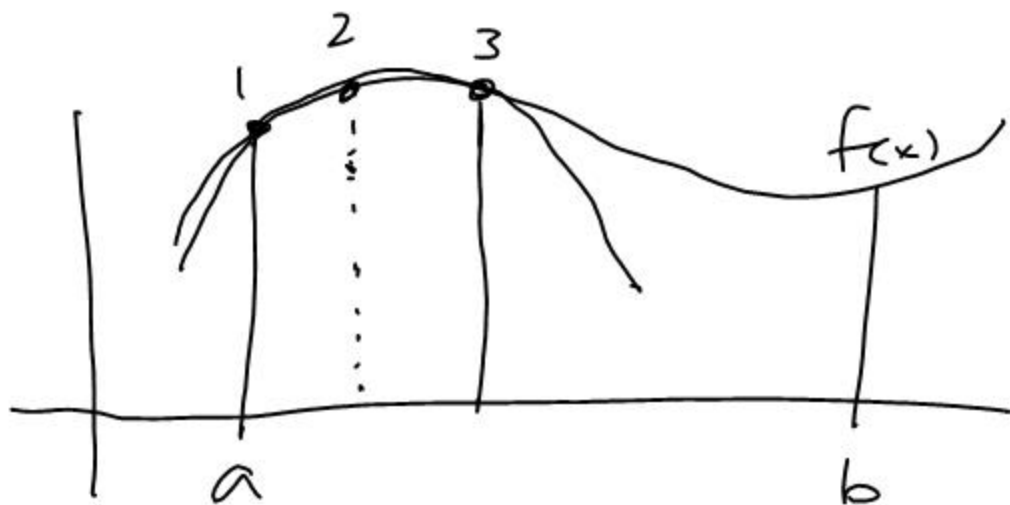


(n is even)

(2e)

$$\frac{b-a}{3n} [f(a) + 4f(a+\Delta x) + 2f(a+2\Delta x)$$
$$+ \dots + f(b)]$$

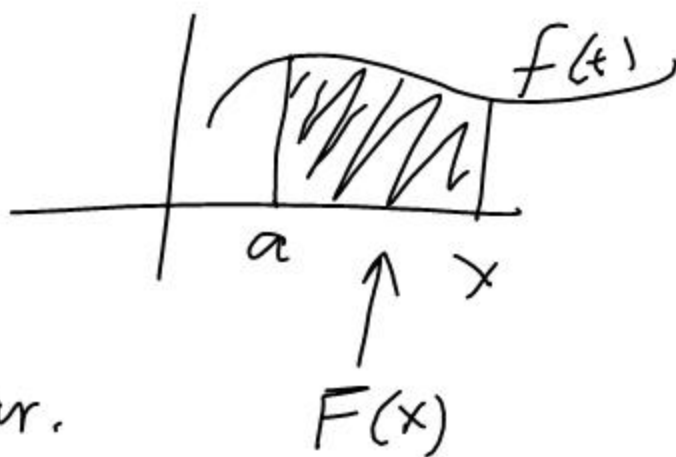
$$\frac{\cancel{9-3}}{\cancel{3(4)}} [2 + 4(1) + 2(3) + 4(4) + 2]$$
$$= 2 + 4 + 6 + 16 + 2$$
$$= \underline{\underline{30}}$$



F T C

$$\frac{d}{dx} \int_a^x f(t) dt$$

\leftarrow ind. var.
 \uparrow dummy var.



$$\frac{d}{dx} \int_a^x f(t) dt = f(x)$$

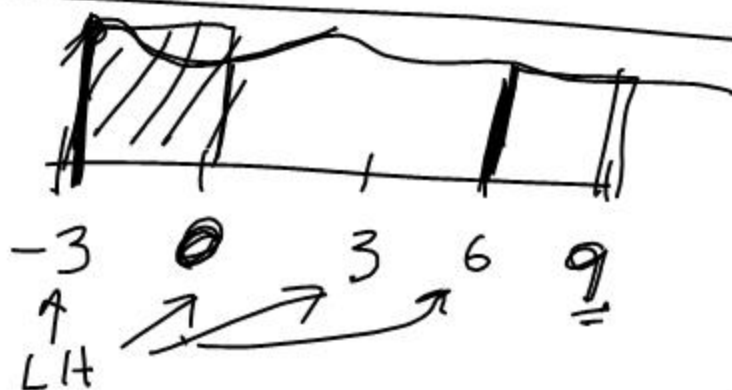
$$\frac{d}{dx} \int_2^x t^2 dt = x^2$$

$$F(x) = \int_2^{x^2} t^3 dt$$

x^2 ← $f(t)$
 t^3

$$F'(x) = (x^2)^3 \cdot 2x - \cancel{2^3 \cdot 0} = 2x^7$$

#2a



$$\sin^2 x = (\sin x)^2$$

$$\sin^2 \theta = 1 - \cos^2 \theta$$

$$\sin 2\theta = 2 \sin \theta \cos \theta$$

$$\sin x^2$$

$$\sin 3\theta = \underline{\hspace{2cm}}$$

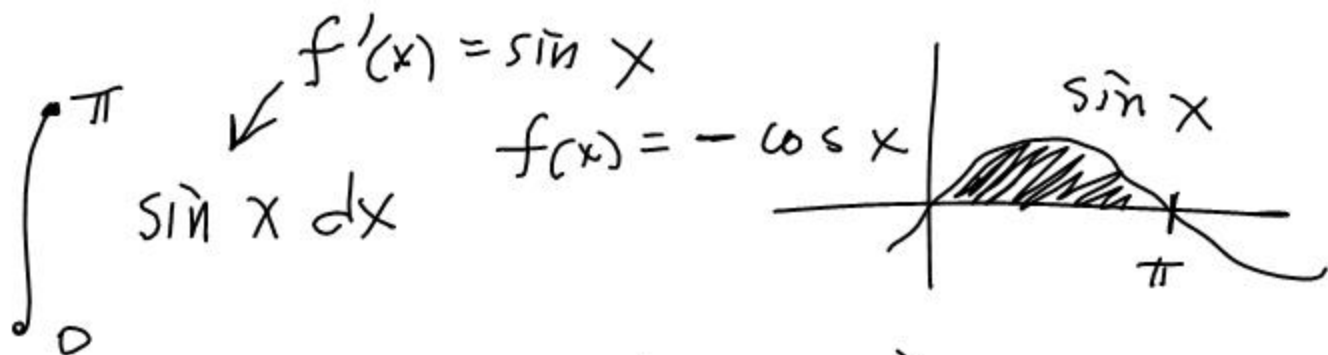
The 2nd FTC

$$\int_a^b f'(x) dx = f(b) - f(a)$$

Ex. $\int_{-1}^2 x^2 dx = \frac{1}{3}(2)^3 - \frac{1}{3}(-1)^3$
 $= \frac{8}{3} + \frac{1}{3} = 3$

$f'(x) = x^2$ \nearrow exact

$f(x) = \frac{1}{3}x^3$



$$= -\cos \pi + (+\cos 0)$$

$$= -(-1) + 1$$

$$= 2$$

Ex. $\int_0^\pi \sin x^2 \, dx$

2nd FTC
is useless
here

2nd FTC (Restatement)

$$\int_a^b f(x) dx = F(b) - F(a),$$

where $F'(x) = f(x)$.

We call $F(x)$ the antiderivative
of $f(x)$.