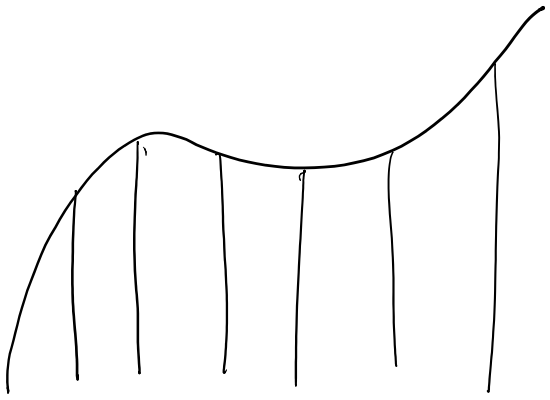
Infinite Sums

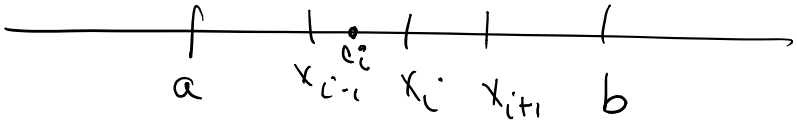
Tuesday, January 16, 2018 8:19 AM



$$\text{Area} = \lim_{n \to \infty} \sum_{i=1}^{n} f(c_i) \cdot \Delta x$$

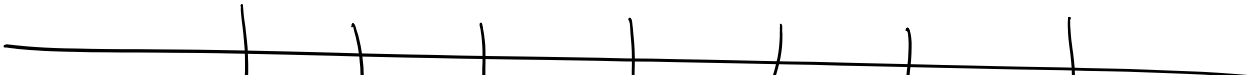
$x_{i-1} < c_i < x_i$

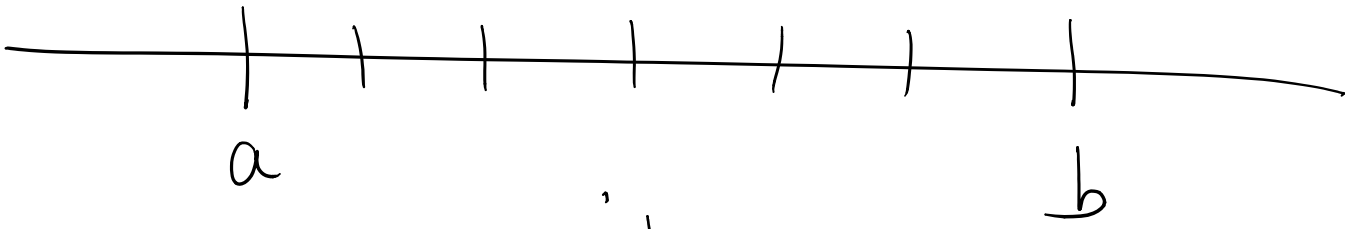
$$\Delta x = \frac{b-a}{n}$$



$c_i = a + (\Delta x)\cdot(i-1)$ Left

or $c_i = a + \Delta x \cdot i$ Right



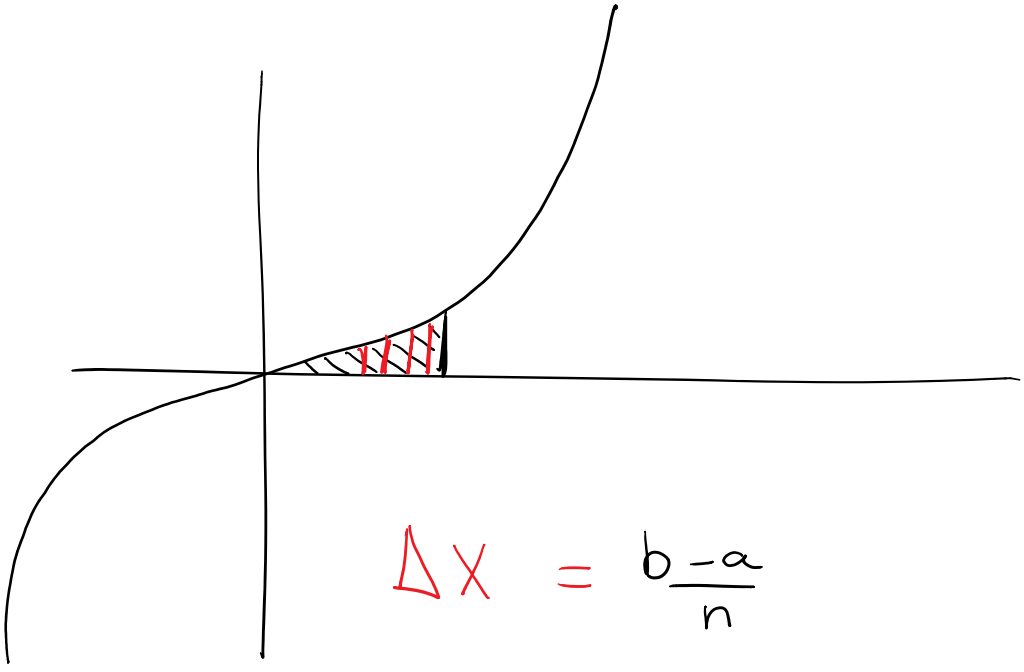


n intervals

as $n \to \infty$

$\Delta x \to 0$

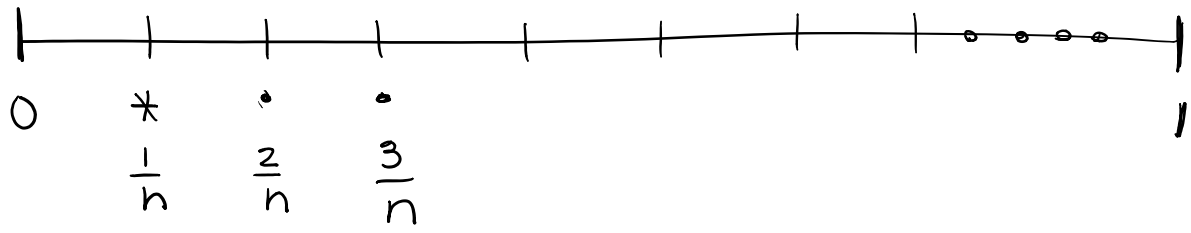
Find Area bounded by $f(x) = x^3$ and $x = 0$, $x = 1$, $y = 0$.



$$\Delta x = \frac{b-a}{n}$$

$$= \frac{1-0}{n}$$

$$= \frac{1}{n}$$



$$x_i = a + \Delta x \cdot i$$

$$x_1 = 0 + \Delta x \cdot 1$$
$$= 0 + \frac{1}{n}$$
$$= \frac{1}{n}$$

$$x_i = i \cdot \frac{1}{n}$$
$$= \frac{i}{n}$$

$$\lim_{n \to \infty} \sum_{i=1}^{n} f(x_i) \cdot \Delta x$$

$$\lim_{n \to \infty} \sum_{i=1}^{n} \left(\frac{i}{n}\right)^3 \cdot \frac{1}{n}$$

$$\lim_{n \to \infty} \sum_{i=1}^{n} \frac{i^3}{n^3} \cdot \frac{1}{n}$$

$$\lim \frac{1}{n} \sum_{i=1}^{n} i^3 \cdot \frac{1}{n^3}$$

$$\lim_{n \to \infty} \frac{1}{n^4} \sum_{i=1}^{n} i^3$$

$n \to \infty \sum_{i=1}$

$$\lim_{n\to\infty} \frac{1}{n^4}\left[\frac{n^2\cdot(n+1)^2}{4}\right]$$

$$n^2(n^2+2n+1)$$
$$n^4+2n^3+n^2$$

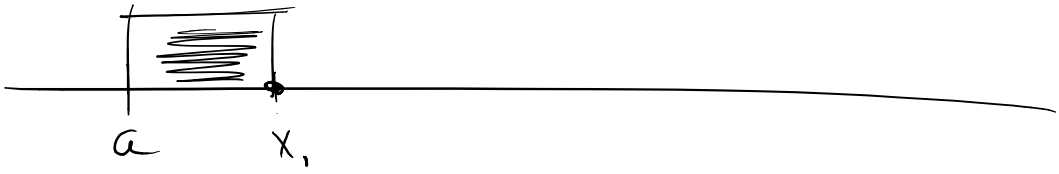
$$\lim_{n\to\infty} \frac{n^4}{4n^4} + \frac{2n^3}{4n^4} + \frac{n^2}{4n^4} + \cdots$$

$$\frac{1}{4}$$

$$\lim_{n\to\infty} \sum f(x_i)\cdot \Delta x$$

$f(x) = 4-x^2$ on $[1,3]$, x axis

$$X_i = a + \Delta x \cdot i$$



$\Delta x = \frac{b-a}{n}$

$$\Delta x = \frac{b-a}{n} = \frac{3-1}{n} = \frac{2}{n}$$

$$x_i = a + \frac{2i}{n}$$

$$= 1 + \frac{2i}{n}$$

$$f: 4 - x^2 \Longrightarrow 4 - \left(1 + \frac{2i}{n}\right)^2$$

A. Δx

B. $x_i = a + \Delta x \cdot i$

C. $f(x_i)$

$$\lim_{n\to\infty} \sum_{i=1}^{n} f(x_i) \cdot \Delta x$$

$$4 - \left[1 + \frac{4i}{n} + \frac{4i^2}{n^2}\right]$$

$$\lim_{n\to\infty} \sum_{i=1}^{n} \left(\underline{\underline{4-1}} - \frac{4i}{n} - \frac{4i^2}{n^2}\right)\frac{2}{n}$$

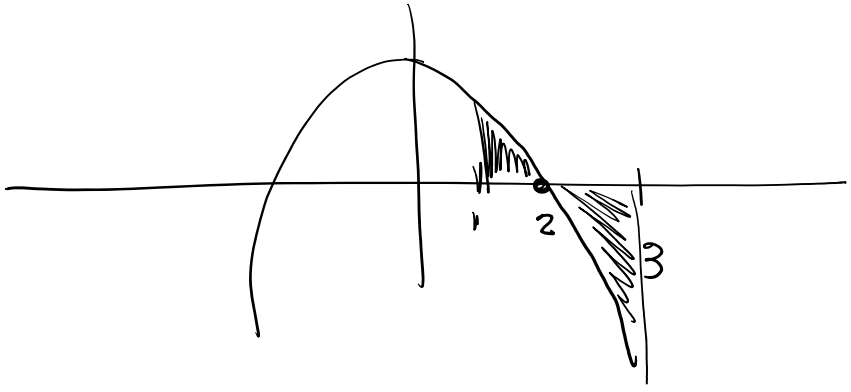
$$\lim_{n\to\infty} \frac{2}{n}\left[\sum_{i=1}^{n} 3 - \frac{4}{n}\sum_{i=1}^{n} i - \frac{4}{n^2}\sum_{i=1}^{n} i^2\right]$$

$$\lim_{n\to\infty} \frac{2}{n}\left[3n - \frac{4}{n}\left(\frac{n(n+1)}{2}\right) - \frac{4}{n^2}\left(\frac{(n^2+n)(2n+1)}{6}\right)\right]$$

$$\lim_{n\to\infty}\left[6 - \frac{8n^2+\cdots}{2n^2} - \frac{16n^3+\cdots}{6n^3}\right]$$

$\frac{8n^2+\cdots}{2n^2} \to 0$ and $\frac{16n^3+\cdots}{6n^3} \to 0$

$$6 - 4 - \frac{16}{6} = \boxed{-\frac{2}{3}}$$



$Y_1 = 4 - x^2$

exit

math 9 (Y_1 , ' , 3 , X) WRT

$$\int_1^3 Y_1 \, dx$$

HW: 4.2

39- 44

lim Σ

Practice

47-54

Δx

x_i

$f\ x_i$

$\lim \sum f(x_i) \cdot \Delta x$