Limits

ε-δ Definition

$\lim_{x \to 2} 5x+3 = 13$

Given $\varepsilon = .01$

Find $\delta = ?$

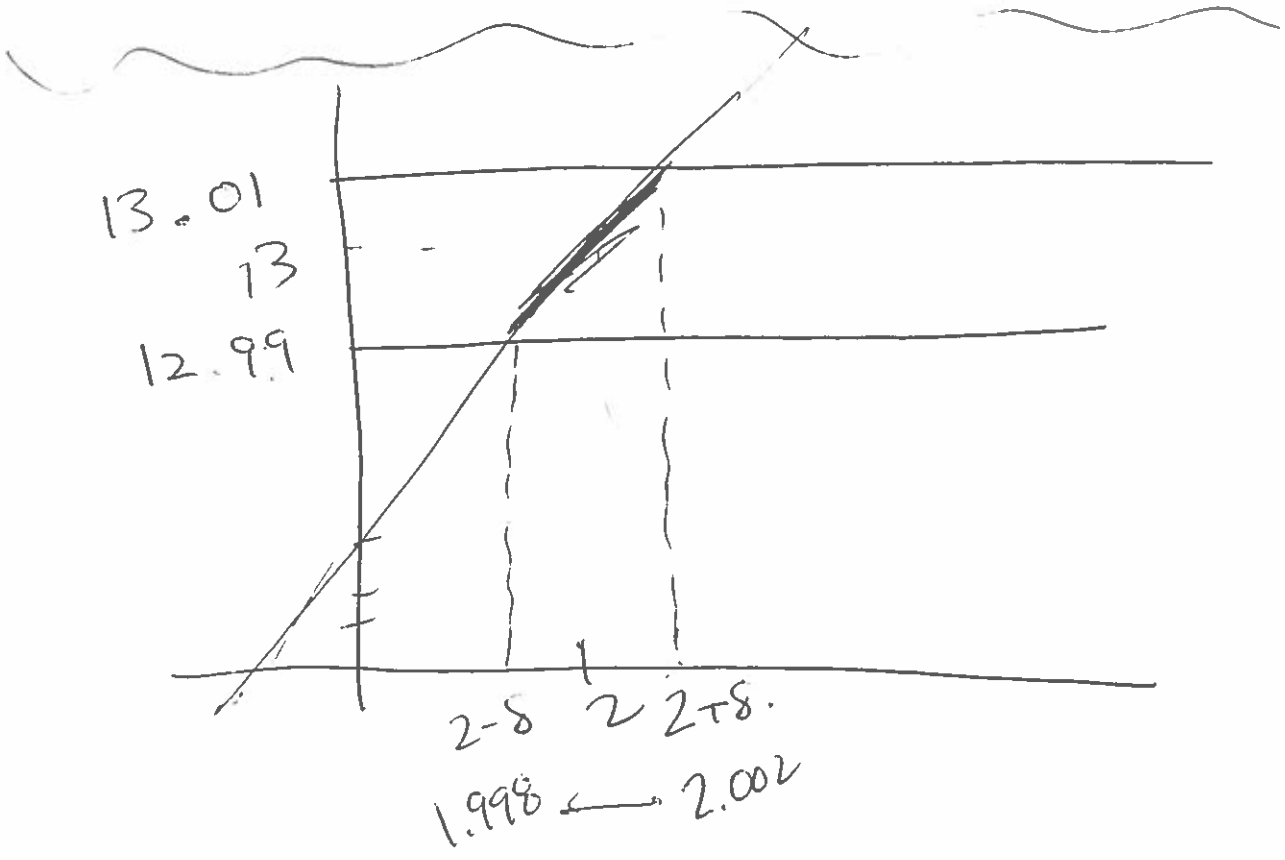
$|f(x) - L| < \varepsilon$

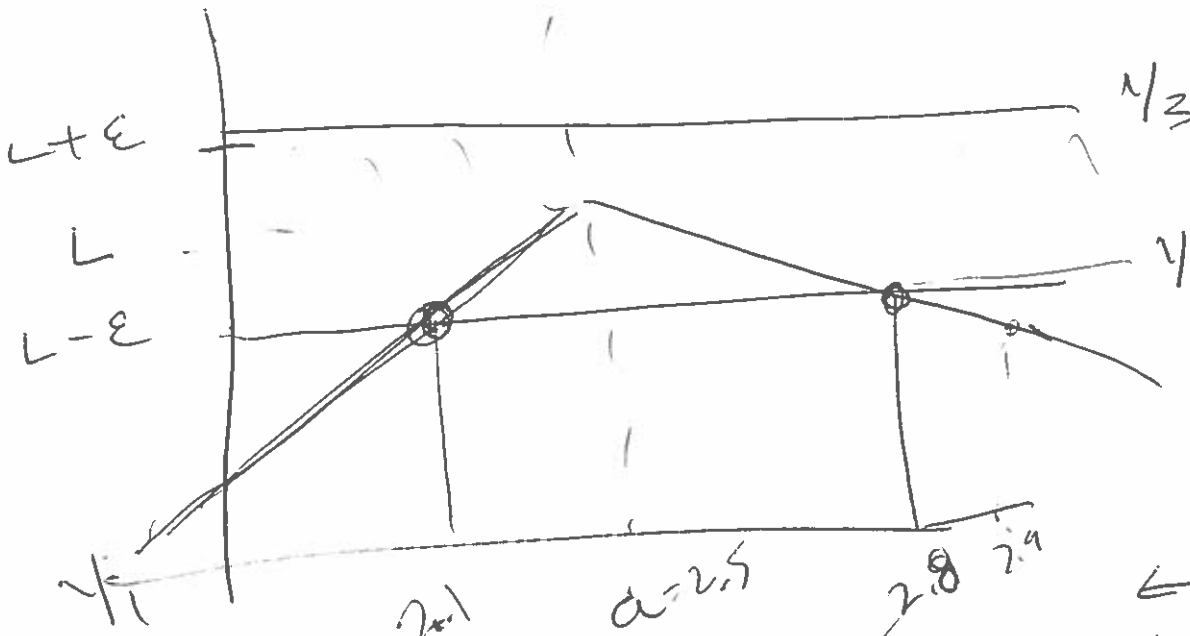
$|5x+3-13| < .01$

$|5x-10| < .01$

$5|x-2| < .01$

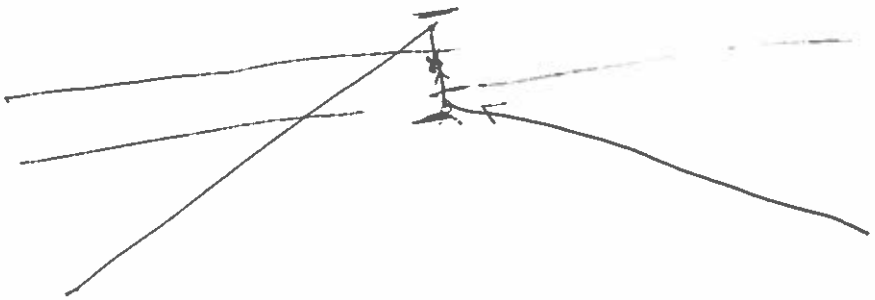
$|x-2| < .002 = \delta$





2.1 ← 2.5 → 2.9

2.2 — 2.5 — 2.8



γ_1 = reg. $\pm .01257$

Derivatives

$$\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$Ax^2 + Bx + C$$

$$f(x+h) = A(x+h)^2 + B(x+h) + C$$

$$-f(x) \quad Ax^2 + Bx + C$$

$$\frac{f(x+h)-f(x)}{h} \quad \frac{2Axh + Ah^2 + Bh}{h}$$

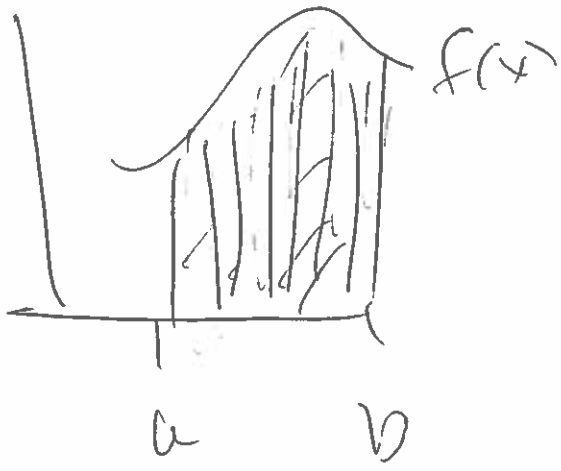
$$\lim_{h \to 0} 2Ax + \cancel{Ah}^{0} + B$$

$$2Ax + B$$

Integrals

Definite

$$\int_a^b f(x)\,dx$$



Adding up Rectangles

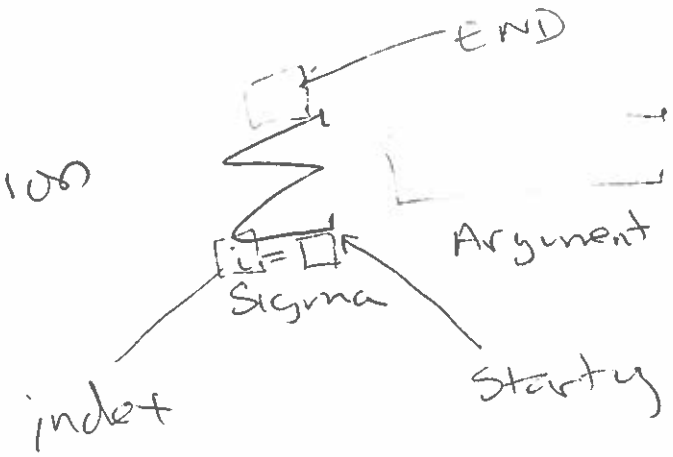
$f(x) \cdot dx = \text{Area}$

$\infty \cdot 0 =$

$n = \#$ rectangles

$\lim_{n \to \infty} A(n) =$

Notation



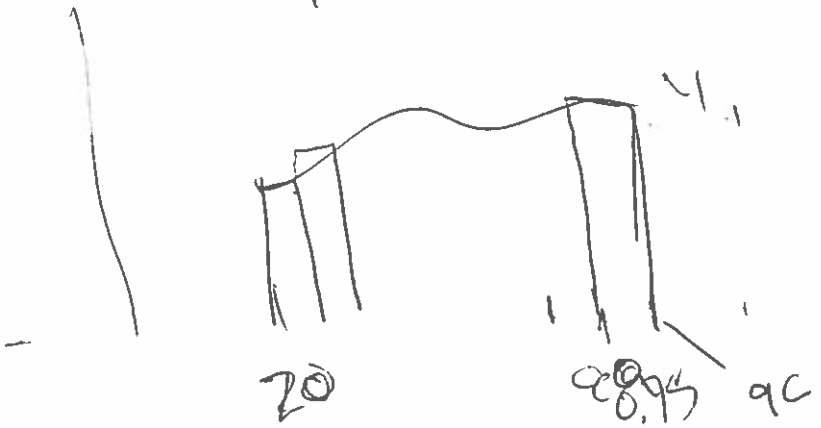
Ex $\sum_{i=1}^{3} 2i+5 = 27$

$i=1$	$i=2$	$i=3$
$2(1)+5$	$2(2)+5$	$2(3)+5$

$7 + 9 + 11 = 27$

$\sum(\text{seq}(2x+5, x, i, 3, 1))$

$\text{Som}(\text{seq}(Y_1, x, 20, 99, .25))$



$79 \times 4 = 316$

$$\sum_{i=1}^{316} Y_1(.25i + 19.75)$$

$$\sum 2i + 5 = \sum 2i + \sum_{i=1}^{3} 5$$

$$2\sum_{i=1}^{3} i \quad + 3.5$$

$$\sum_{i=1}^{n} \text{Constant} \quad \text{constant} \cdot n$$

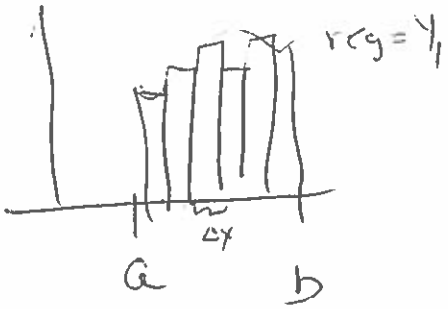
$$\sum_{i=1}^{n} i = (1+n)\left(\frac{n}{2}\right)$$

$1+2+3+4 = 10$

$1+2+3+\cdots+99+100 = 5050$

$$\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$$

$$Y_1 = Ax^2 + Bx + C$$



Start: ~~a~~ $a + \Delta x$

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

Δx = change = $\frac{b-a}{n}$

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

$$A(n) = \left(\sum_{i=1}^{n} A(a + i\Delta x)^2 + B(\quad) + C \right) \Delta x$$

Start $a + \Delta x$

END B

$$a + i\left(\frac{b-a}{n}\right)$$

$$i = n \Rightarrow a + n\left(\frac{b-a}{n}\right) = b$$

$$A(n) = \sum_{i=1}^{n} A\left(a + i\left(\frac{b-a}{n}\right)\right)^2 + B\left(a + i\left(\frac{b-a}{n}\right)\right) + C \Delta$$

$$A(n) = \left[\sum A\left(a^2 + 2ai\left(\frac{b-a}{n}\right) + i^2\left(\frac{b-a}{n}\right)^2\right) + B\left(a + i\left(\frac{b-a}{n}\right)\right) + C \right) \Delta x$$

$$\sum_{i=1}^{n} A\left(\frac{b-a}{n}\right)^2 i^2 + \sum_{i=1}^{n} \left(2Aa\left(\frac{b-a}{n}\right) + \left(\frac{b-a}{n}\right)\right) i + \sum_{i=1}^{n} Aa^2 + Ba + C \Big) \Delta x$$

$$\sum_{i=1}^{n} \frac{\text{Number}}{n^2} i^2$$

$$\left(\frac{\text{Number1}}{n^2}\left(\sum_{i=1}^{n} i^2\right) + \frac{\text{Number2}}{n}\sum_{i=1}^{n} i + \text{Number}\right) \frac{b-a}{n}$$

$$\lim_{n\to\infty} \frac{n^3 + \text{crap}}{n^3} + \frac{n^2}{n^2} + \frac{n}{n}$$

Sum Seq(f(x), x, a, b, Δx)) Δx

= A(n)

Exact Area

$$\lim_{n \to \infty} A(n) = \int_a^b f(x)\,dx$$

$$A(n) = \sum_{i=1}^{n} |A(\quad) + B|$$

$a + i\Delta x$

$a + i\left(\frac{b-a}{n}\right)$

$$\text{(exp)} \sum_{i=1}^{n} i \quad + \text{(exp)} \cdot n$$

$A = -16 \quad B = 1200$

$$\left(\sum_{i=1}^{n} -16\left(15 + \frac{40}{n} i\right) + 1200 \right) \frac{40}{n}$$

$a = 15$

$b = 55$

$\Delta x = \frac{55-15}{n} = \frac{40}{n}$

$$\left(\sum -240 + \frac{-640}{n} i + 1200 \right) \frac{40}{n}$$

$$\left(\sum 960 - \frac{640}{n} i \right) \frac{40}{n}$$

$$\left(\sum_{i=1}^{n} 960 - \sum \frac{640}{n} i \right) \frac{40}{n}$$

$$960n - \frac{640}{n}\left(\frac{(n+1)}{2}\right)\left(\frac{40}{n}\right)$$

$\sum i$

$$960 \cdot 40 - \frac{640 \cdot 40 \cdot n \cdot n+1}{2 \cdot n}$$

$$A(n) = 38400 - 25600\left(\frac{n+1}{n}\right)$$

GROUP NAME:

Date:

Student Names (First and Last)

Speaker/Presenter:

Writer/Prep:

Leader/Collaborator:

Independant Variable (x-axis):

Dependant Variable (y-axis):

Conclusion (in words):

Supporting Work:

$$\sum \left(\left(0 + \frac{2}{n}\right)\right)$$

$$\sum \left(\left(0 + \frac{84}{n}i\right) + 756\right)\frac{12}{n}$$

$$\sum \left(756 + \frac{84}{n}i\right)\frac{12}{n}$$

$$\left(\sum^{n} 756 + \sum \frac{84}{n}i\right)\frac{12}{n}$$

$$\left(\sum 756n + \frac{84}{n}(n+1)\left(\frac{n}{2}\right)\right)\frac{12}{n}$$

$$756(12) + \frac{84 \cdot 12 \cdot \cancel{n} \cdot n+1}{\cancel{n} \cdot n}$$

$$A(n) = 9072 + \frac{1008}{2}\frac{(n+1)}{n}$$

GROUP NAME: P minions

Date: 4/15/14

Student Names (First and Last)

Speaker/Presenter: Dallen / Kero

Writer/Prep: Jenn

Leader/Collaborator: Jason / Daniella

Independant Variable (x-axis): years

Dependant Variable (y-axis): ___ tuition $

Conclusion (in words):

Supporting Work:

linear reg $49.8x + 2767.6$

$a = 10$

$b = 14$

$\Delta x = \frac{14-10}{n} = \frac{4}{n}$

$$\left(\sum_{i=1}^{n} 49.8(10 + \tfrac{4}{n}i) + 2767.6 \right) \tfrac{4}{n}$$

$$\left(\sum 498 + \tfrac{199.2}{n} i + 2767.6 \right) \tfrac{4}{n}$$

$$\left(\sum 3265.6 + \tfrac{199.2}{n} i \right) \tfrac{4}{n}$$

$$\left(\sum 3265.6 + \sum \tfrac{199.2}{n} i \right) \tfrac{4}{n}$$

$$3265.6n + \tfrac{199.2}{n}(n+1)\left(\tfrac{n}{2}\right)\left(\tfrac{4}{n}\right)$$

$$3265.6(4) + \frac{199.2 \cdot 4 \cdot \cancel{n} \cdot n+1}{\cancel{n} \cdot n}$$

EXACT 13460 $

$$A(n) = 13062.4 + \frac{796.8}{2}\frac{(n+1)}{n}$$

sum(seq(y1, x, 10.4, 14, .4))*.4

Sum seq = 13500 10 right

A(10) 13500 10 right

GROUP NAME: Fluffy Ponies
Date: 4/15/14

Student Names (First and Last)
Speaker/Presenter: Milton/Ahmed
Writer/Prep: Courtney
Leader/Collaborator: Tyler/June

Independant Variable (x-axis): Income
Dependant Variable (y-axis): crime rate

Conclusion (in words):

Supporting Work:

linear reg:

$y = -.0011x + .348$

$\left(\sum_{i=1}^{n} -.0011\left(20 + \frac{80}{n} i\right) + .348 \right) \frac{80}{n}$

$\left(\sum -.022 + -\frac{.088}{n} i + .348 \right) \frac{80}{n}$

$\left(\sum .326 - \frac{.088}{n} i \right) \frac{80}{n}$

$\left(\sum_{i=1}^{n} .326 - \sum \frac{.088}{n} i \right) \frac{80}{n}$

$a = 20$

$b = 100$

$\Delta x = \frac{100-20}{n} = \frac{80}{n}$

$\left(.326n - \frac{.088}{n}(n+1)\left(\frac{1}{2}\right) \right) \frac{80}{n}$

$26.08 - \frac{.088 \cdot 80 \cdot n \cdot n+1}{n \cdot n \cdot 2}$

$A(n) = 26.08 - \frac{7.04(n+1)}{2n}$

$A(n) = 26.08 - \frac{3.52(n+1)}{n}$