

Riemann Sums, an Introduction

Guest Lecturer,
Jumar Martin

AP Calculus AB | 2019 - 02 - 10

Who are you?

- Senior @ Phillip O. Berry Academy of Technology
- Not a math whiz
- Not Mrs. Hafizoglu



Agenda

Definition of Riemann Sums

Left Riemann Sums

Right Riemann Sums

Midpoint Riemann Sums

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$$A = \lim_{n \rightarrow \infty} \sum_{k=1}^n f(c_k) \Delta x = \int_a^b f(x) dx$$

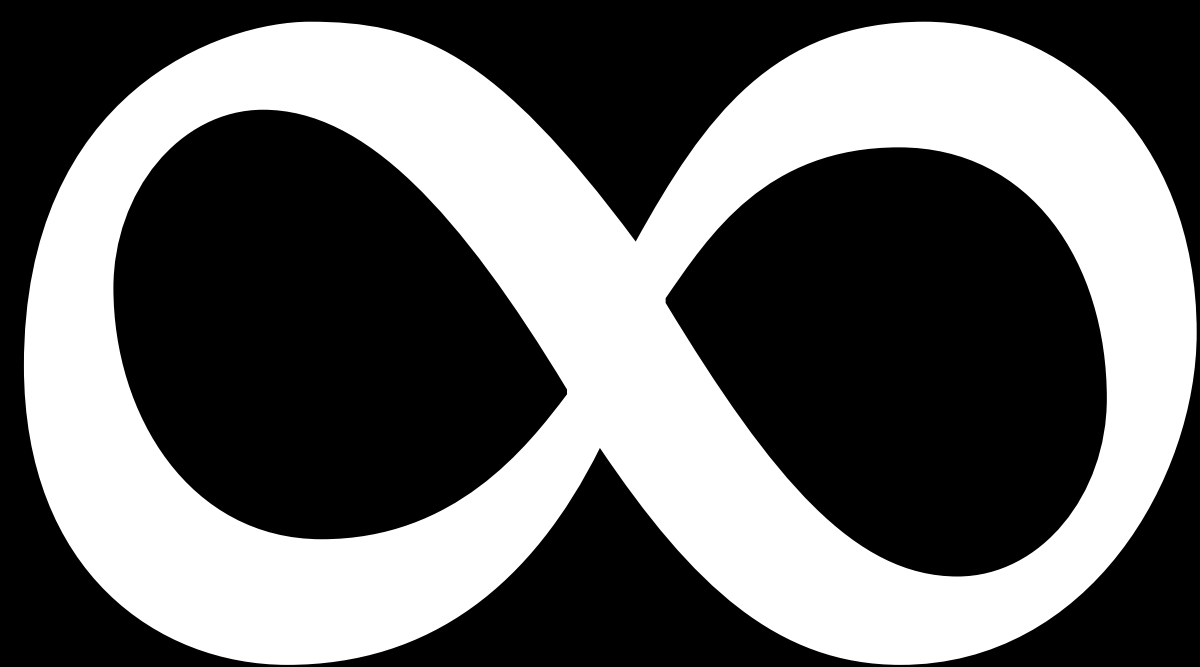
$$A = \lim_{n \rightarrow \infty} \sum_{k=1}^n f(c_k) \Delta x$$

Really slow.

(Until we get to integrals.)

$$A = \lim_{n \rightarrow \infty} \sum_{k=1}^n f(c_k) \Delta x$$

$$\lim_{n \rightarrow \infty}$$



5

$$A = \lim_{n \rightarrow 5} \sum_{k=1}^n f(c_k) \Delta x$$

$$\sum_{k=1}^5 f(c_k) \Delta x$$

Δx

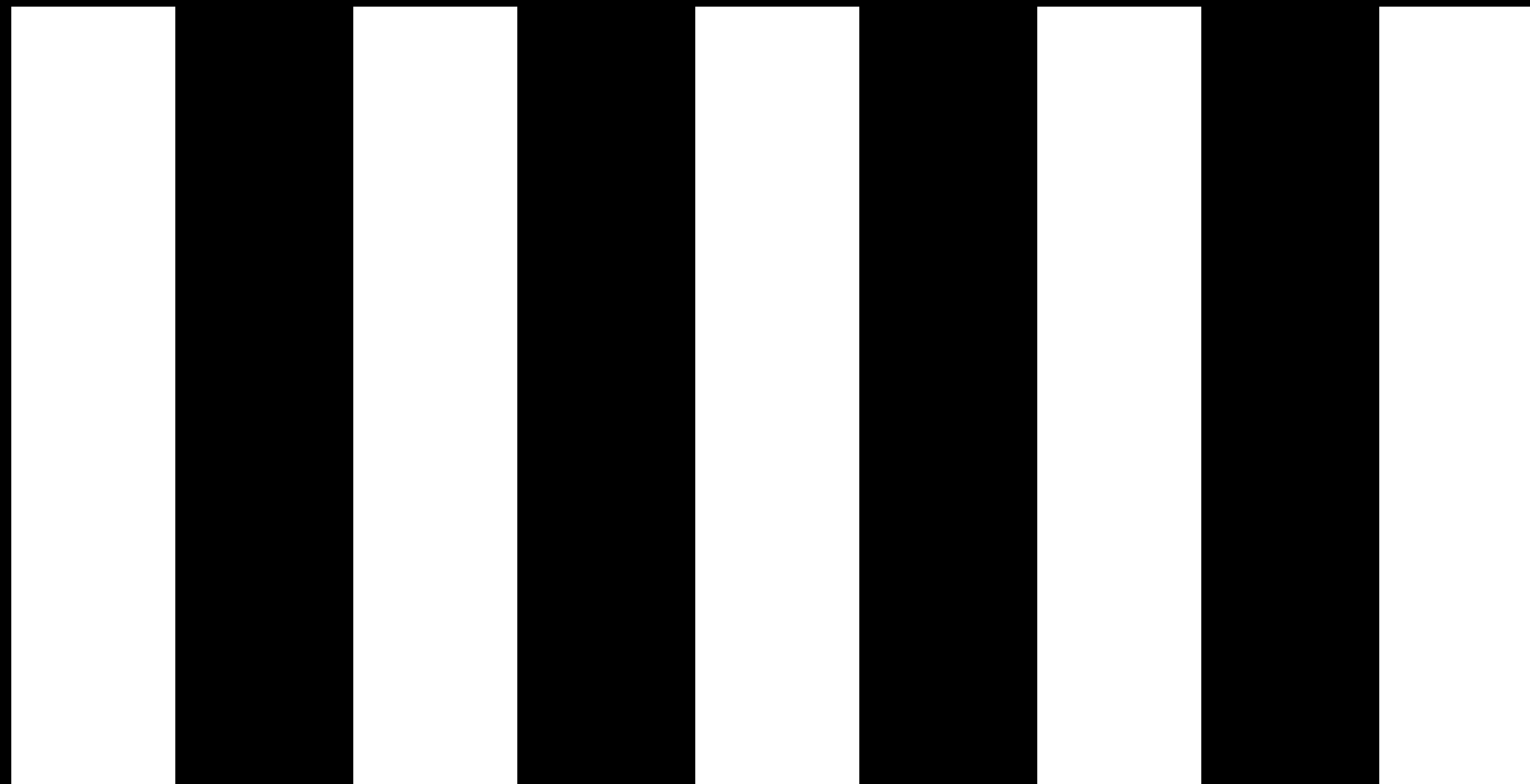
$$\Delta x = \frac{b - a}{n}$$

$c \{0, 1, 2, 3, 4, 5\}$
 a b

$c \{0, 5\}$
 $a \quad b$

$$\Delta x = \frac{5 - 0}{n}$$

$n =$





jumar 3:19 PM

I'm just imaging the questions

"Why are we using rectangles instead of circles?"



vietfu 3:21 PM

I suppose you could approximate area with infinitesimally small circles but that'd be ridiculous

$$\Delta x = \frac{5 - 0}{5}$$

$$\sum_{k=1}^5 f(c_k) \Delta x$$

$$A = \lim_{n \rightarrow 5} \sum_{k=1}^n 1 \cdot f(c_k)$$

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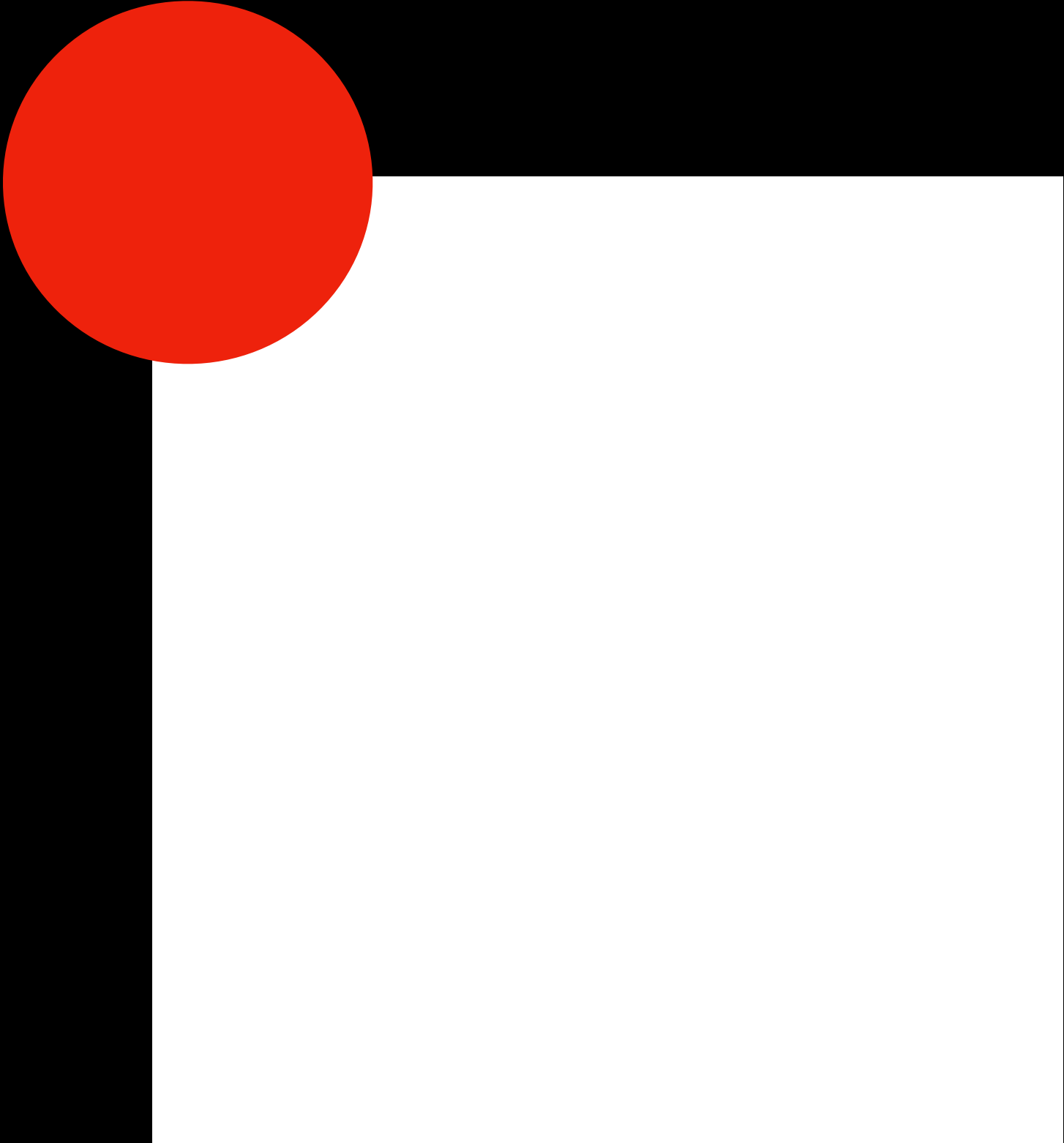
Agenda

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Left Riemann Sums

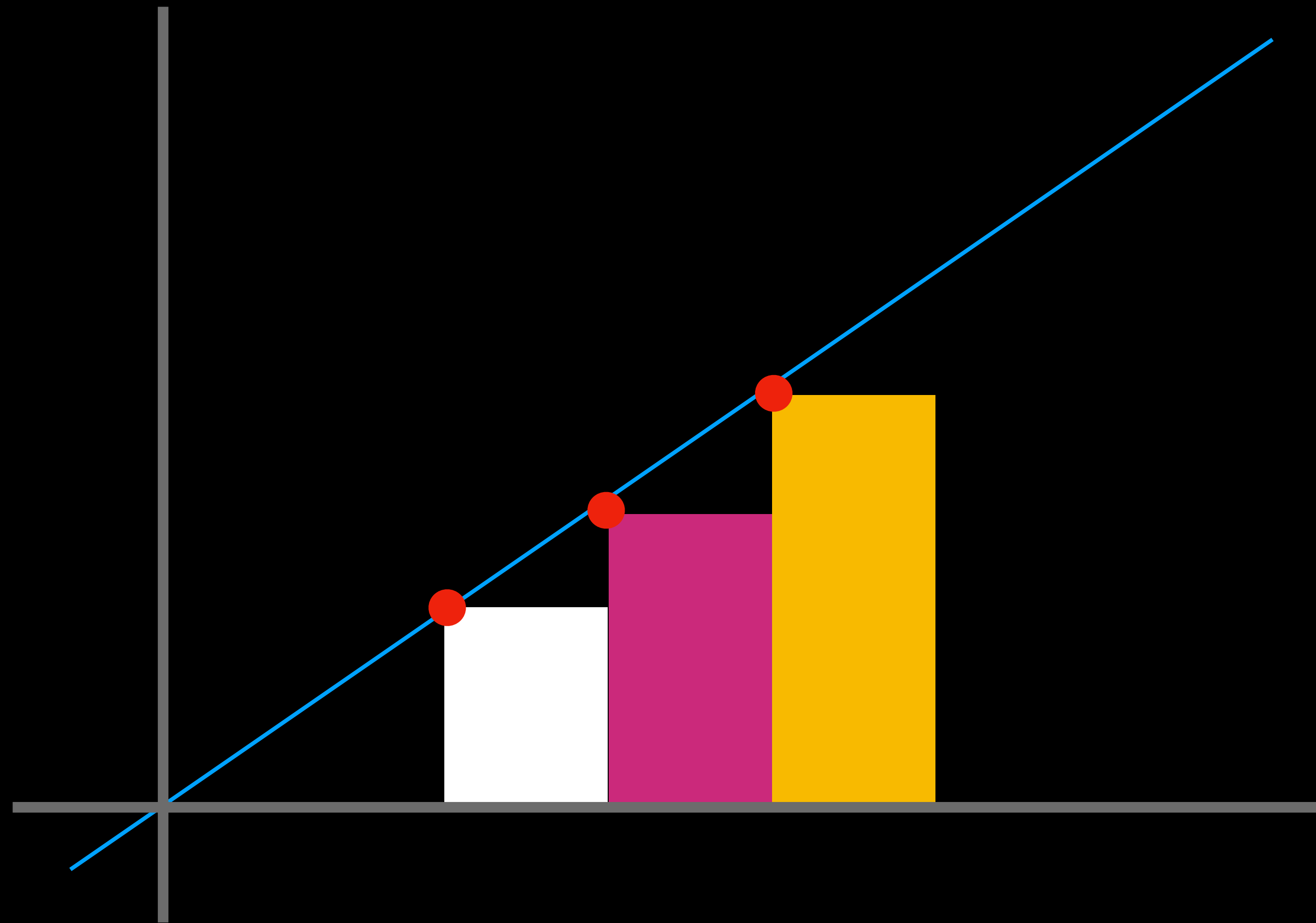
Right Riemann Sums

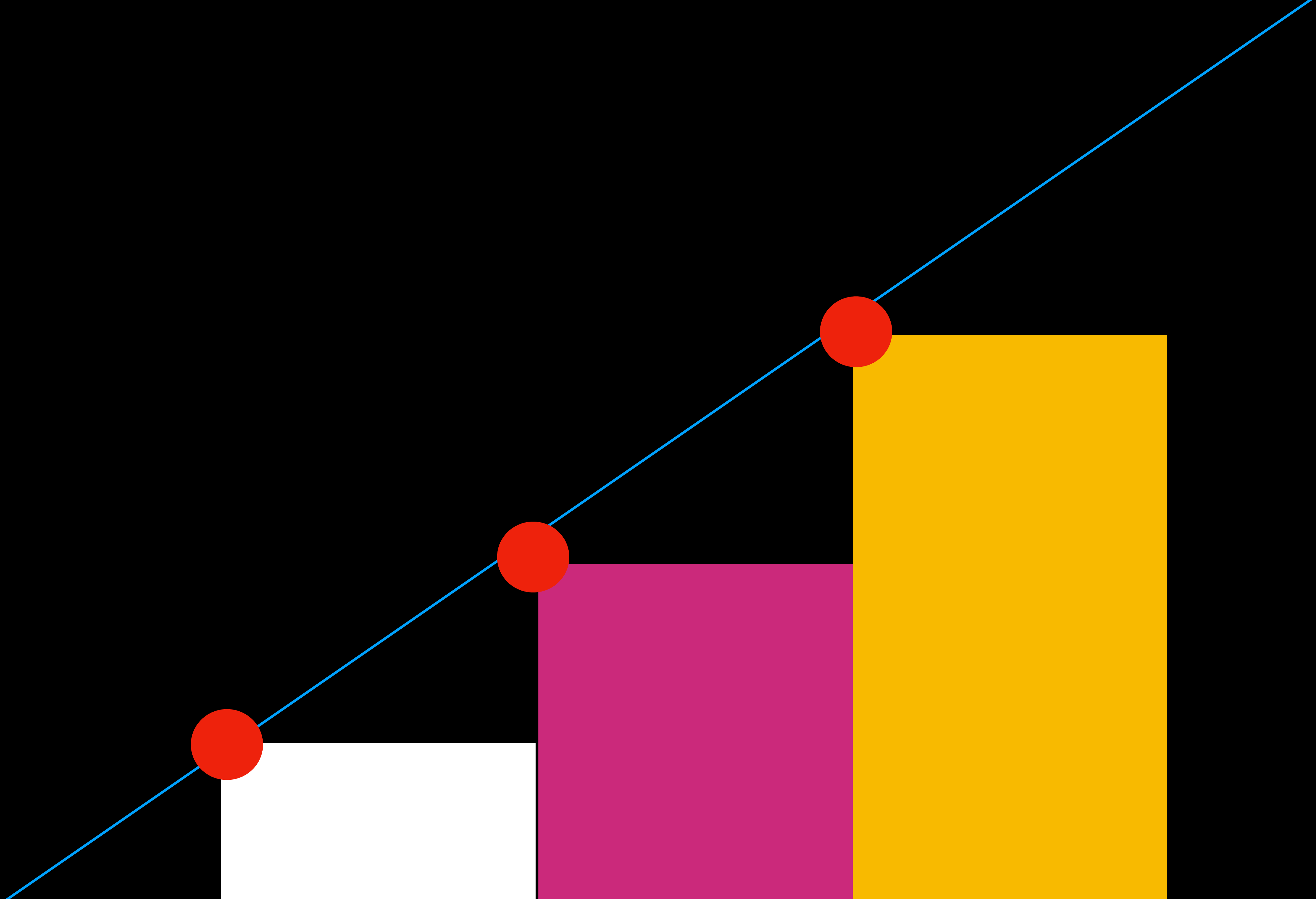
Midpoint Riemann Sums



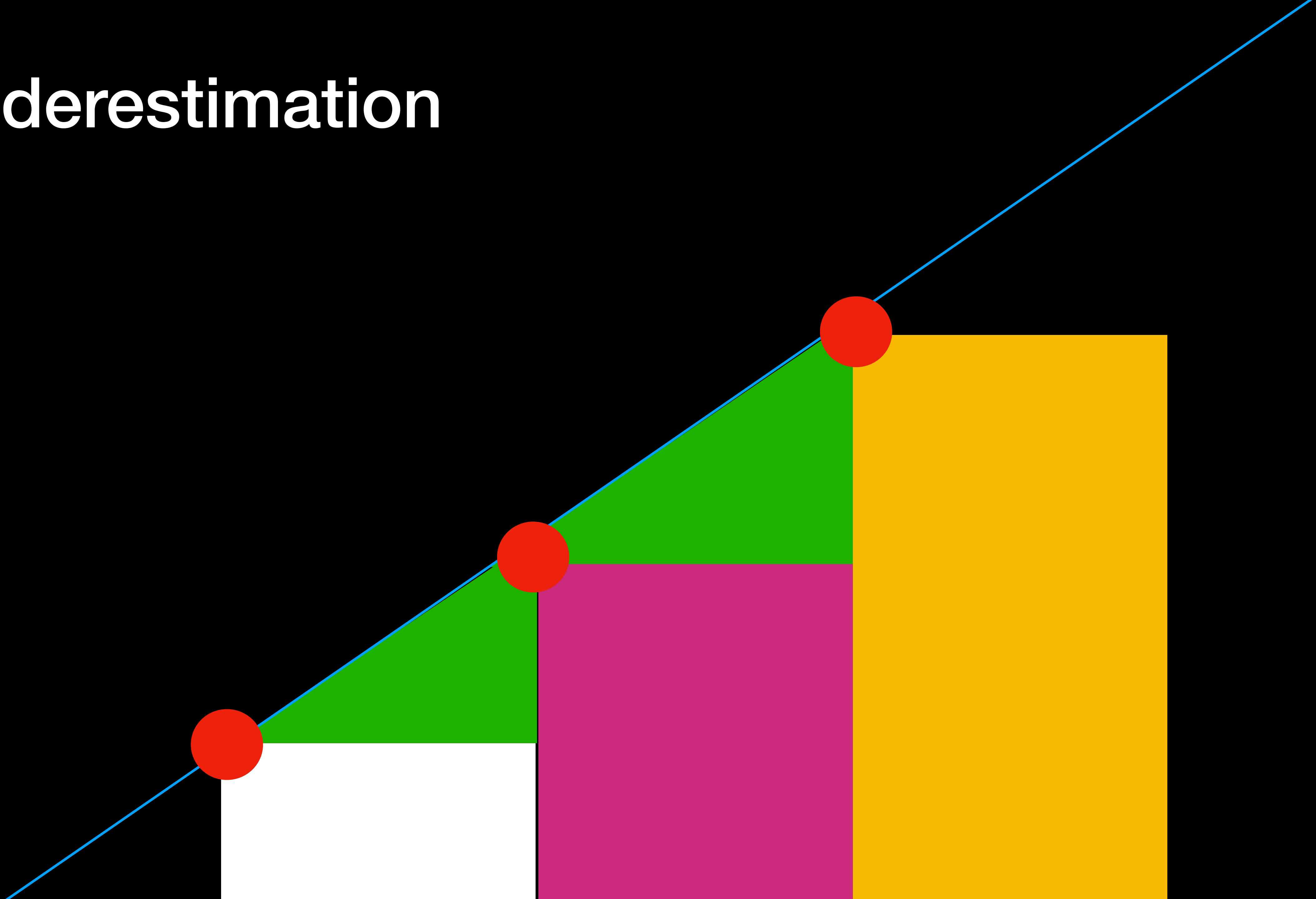
Left Riemann Sums

$$y = x$$





Underestimation



Example #1

$$A = \lim_{n \rightarrow 5} \sum_{k=1}^n 1 \cdot f(c_k)$$

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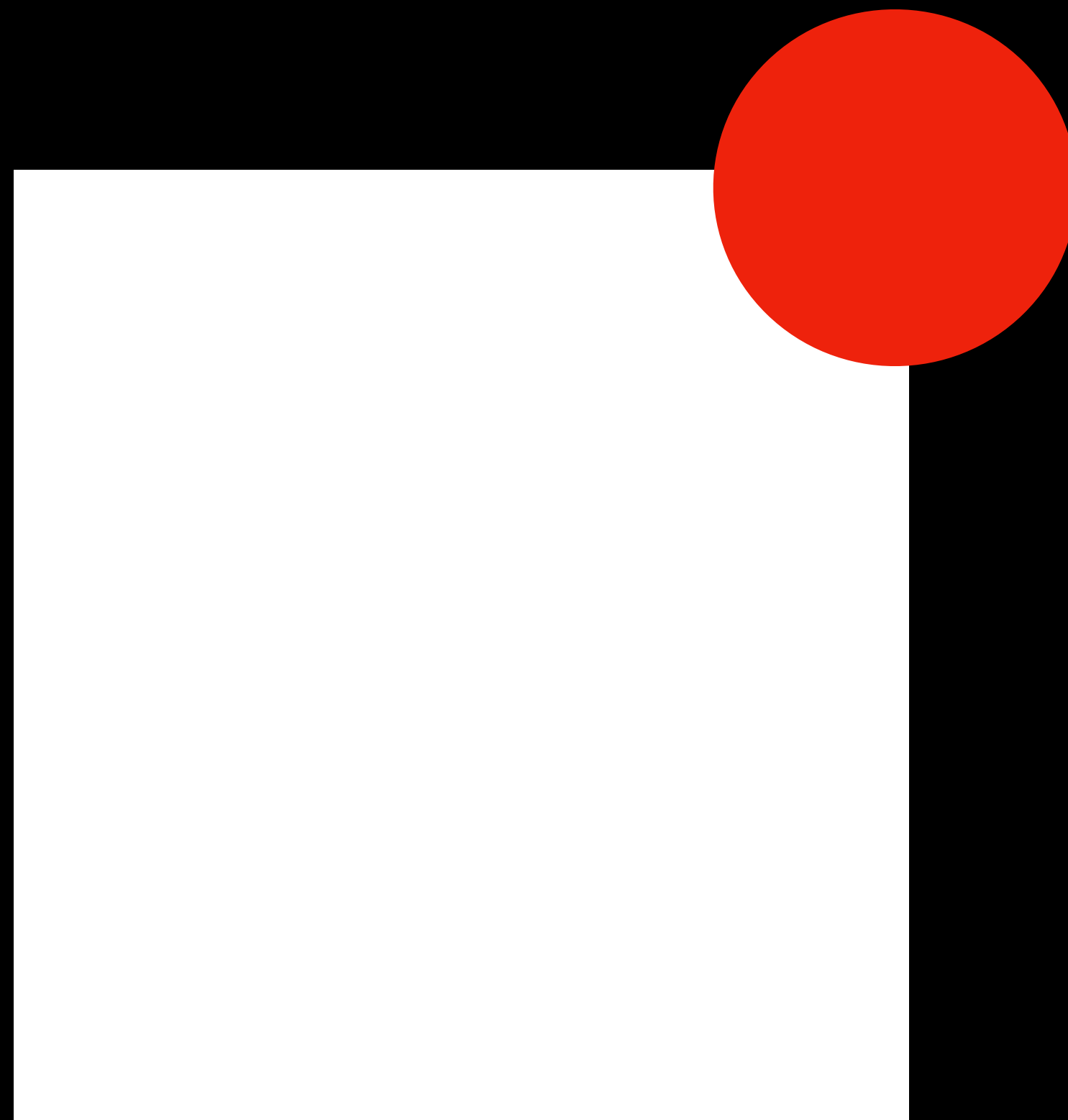
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Definition of Riemann Sums

Left Riemann Sums

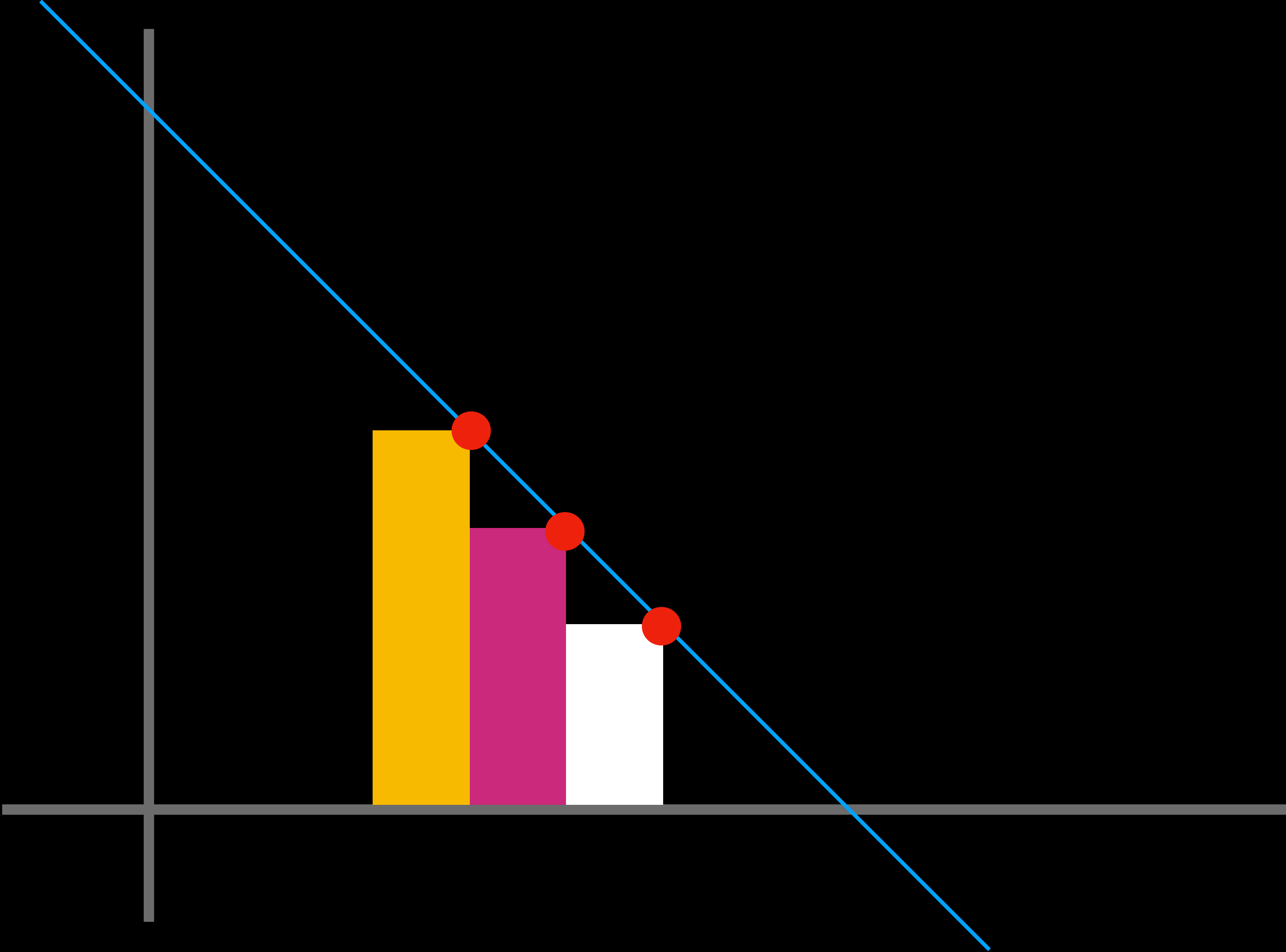
Right Riemann Sums

Midpoint Riemann Sums

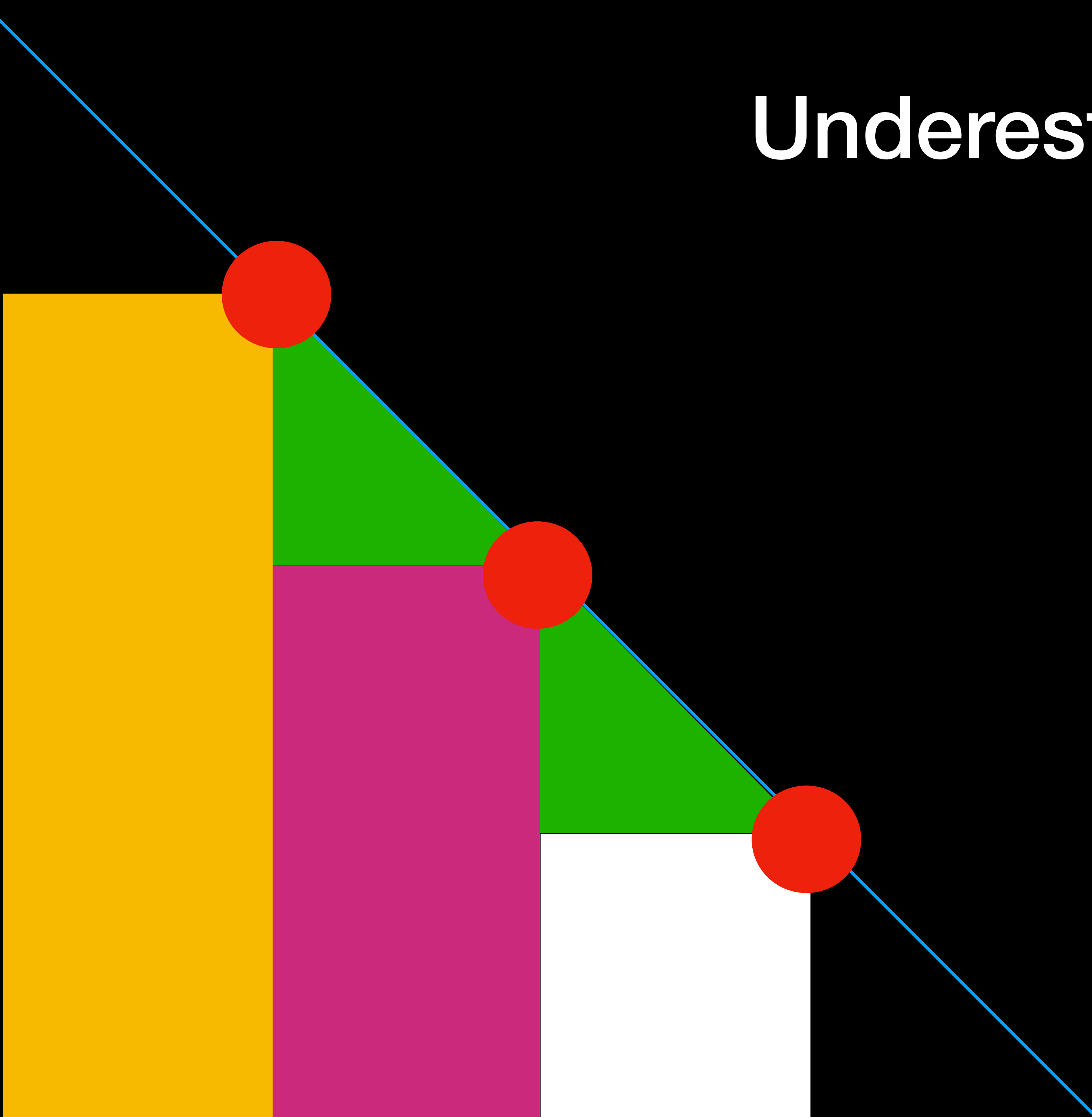


Right Riemann Sums

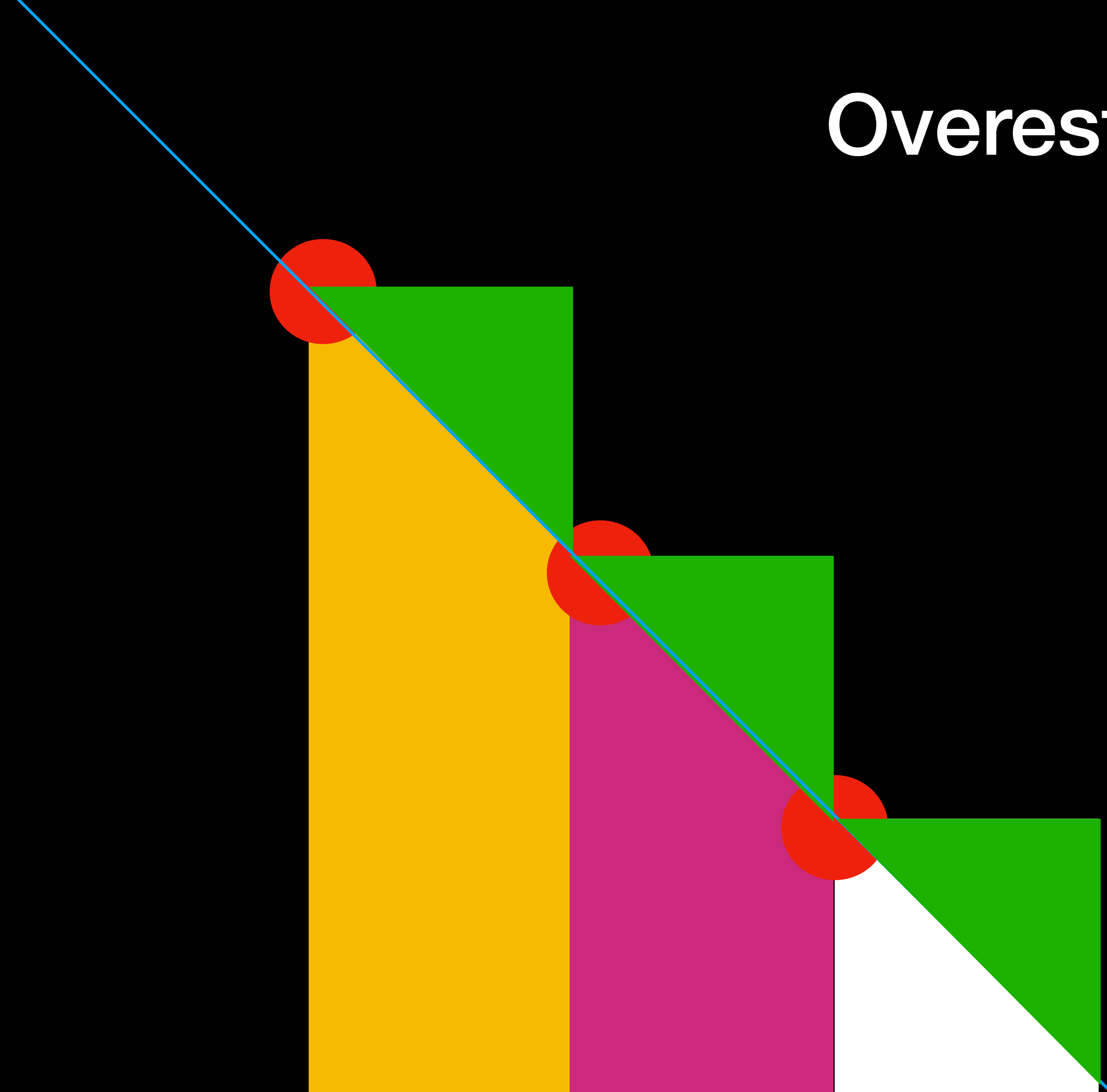
$$y = 3 - x$$



Underestimation



Overestimation



Example #2

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Midpoint Riemann Sums

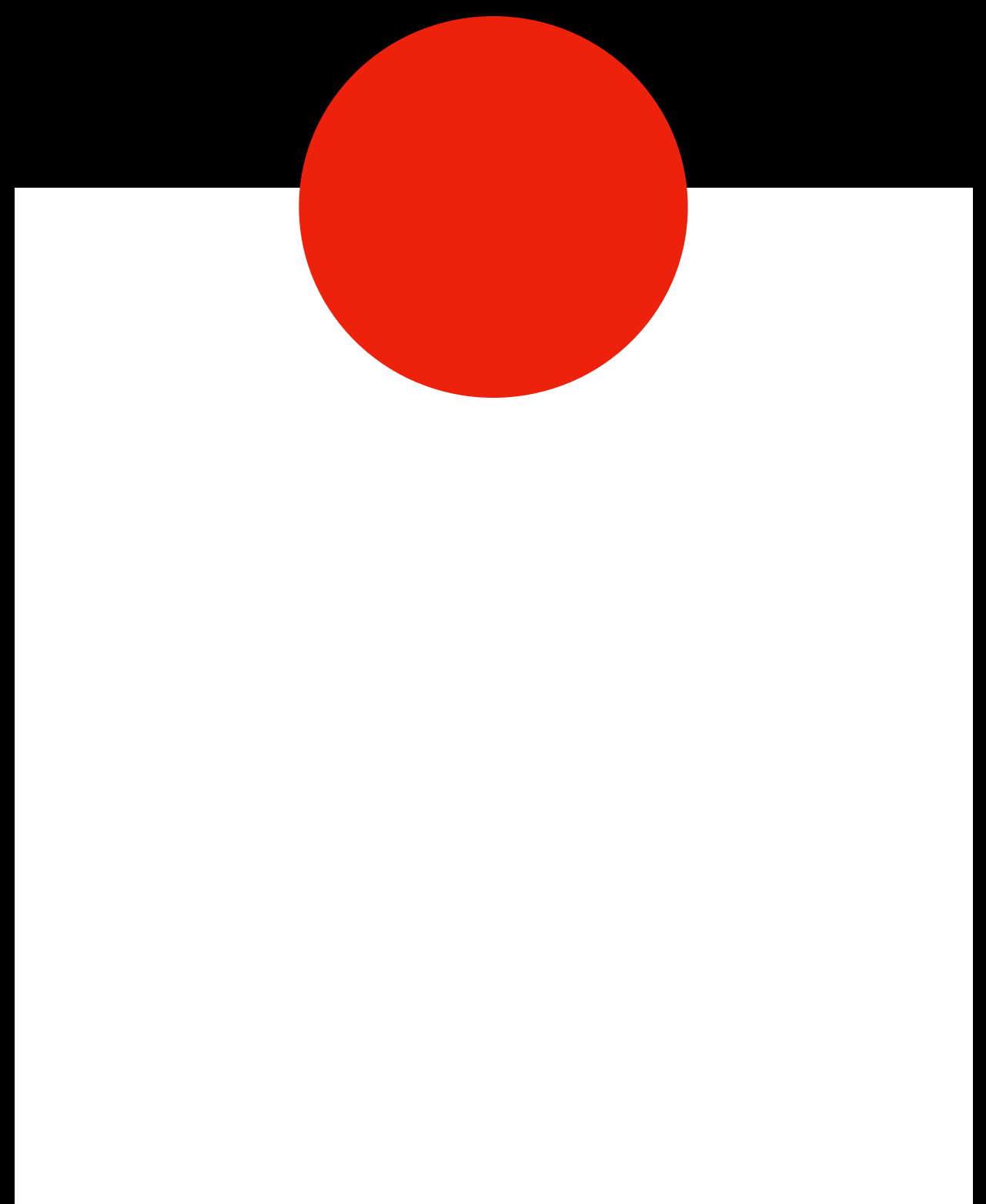
Agenda

Definition of Riemann Sums

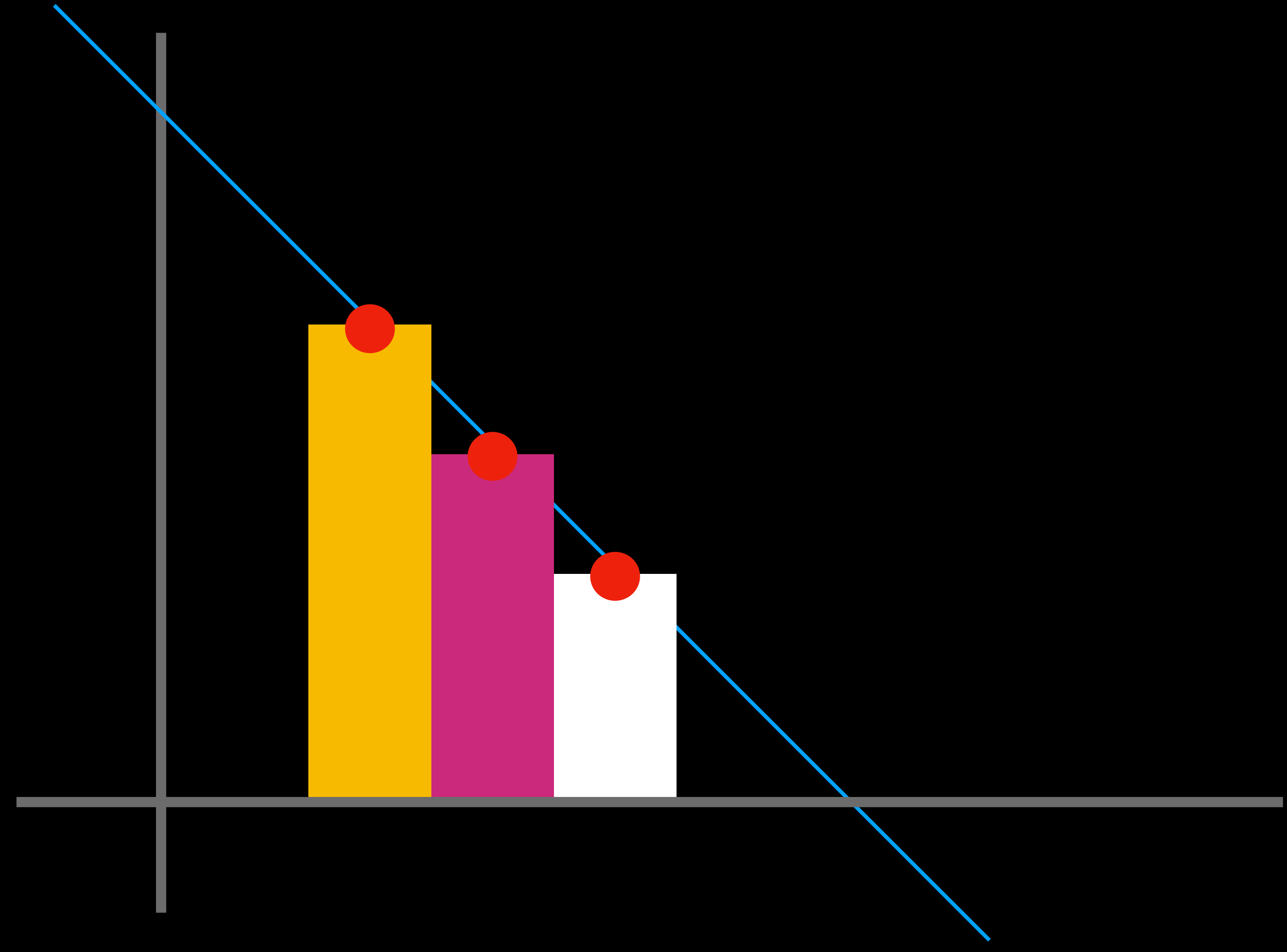
Left Riemann Sums

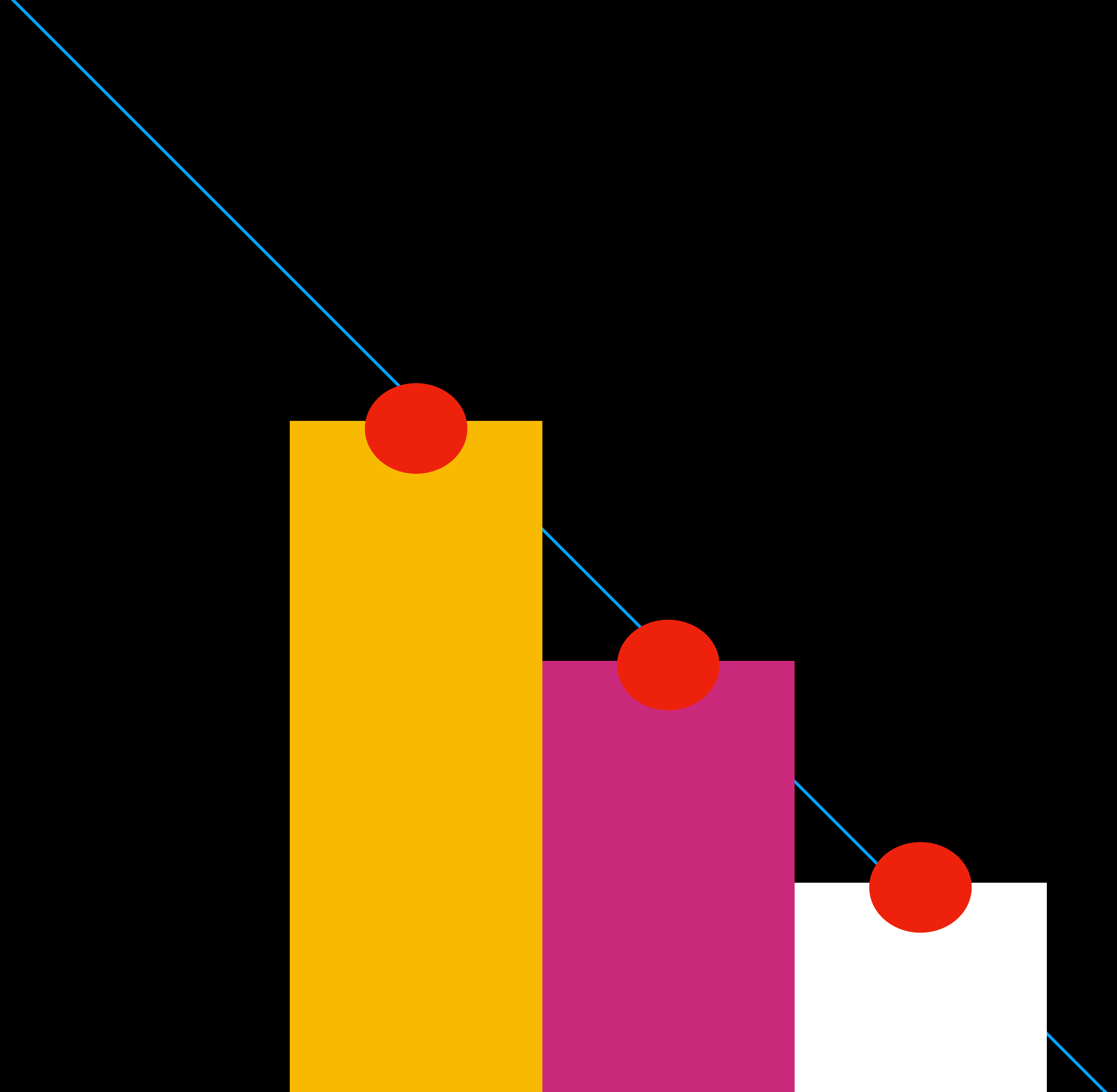
Right Riemann Sums

Midpoint Riemann Sums

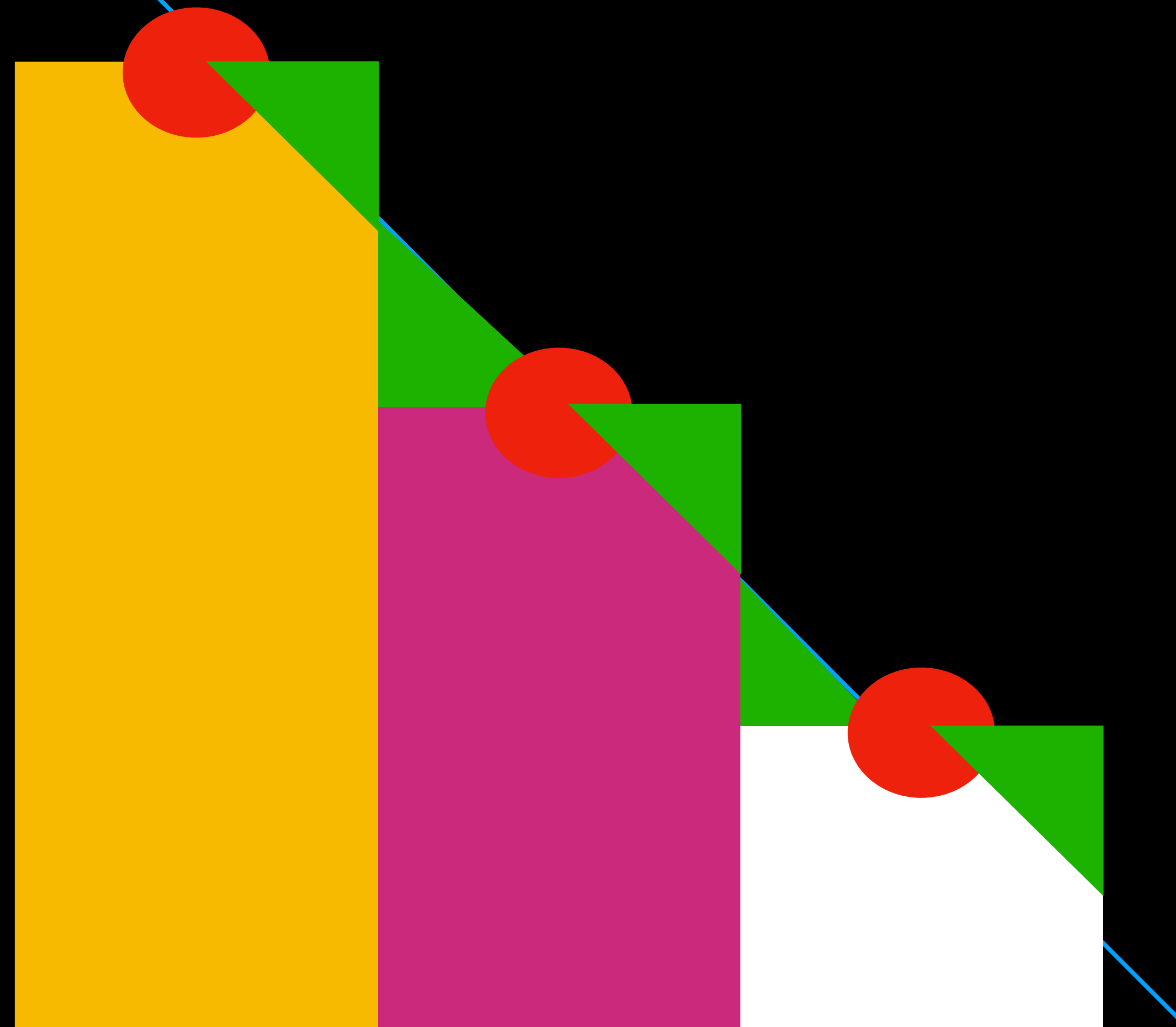


$$y = 3 - x$$





Over & Underestimation



Example #3