Physics 421 - Lecture 16

Numerical Integration

(actually, one of the first "killer apps" for Computers !!)

Example:

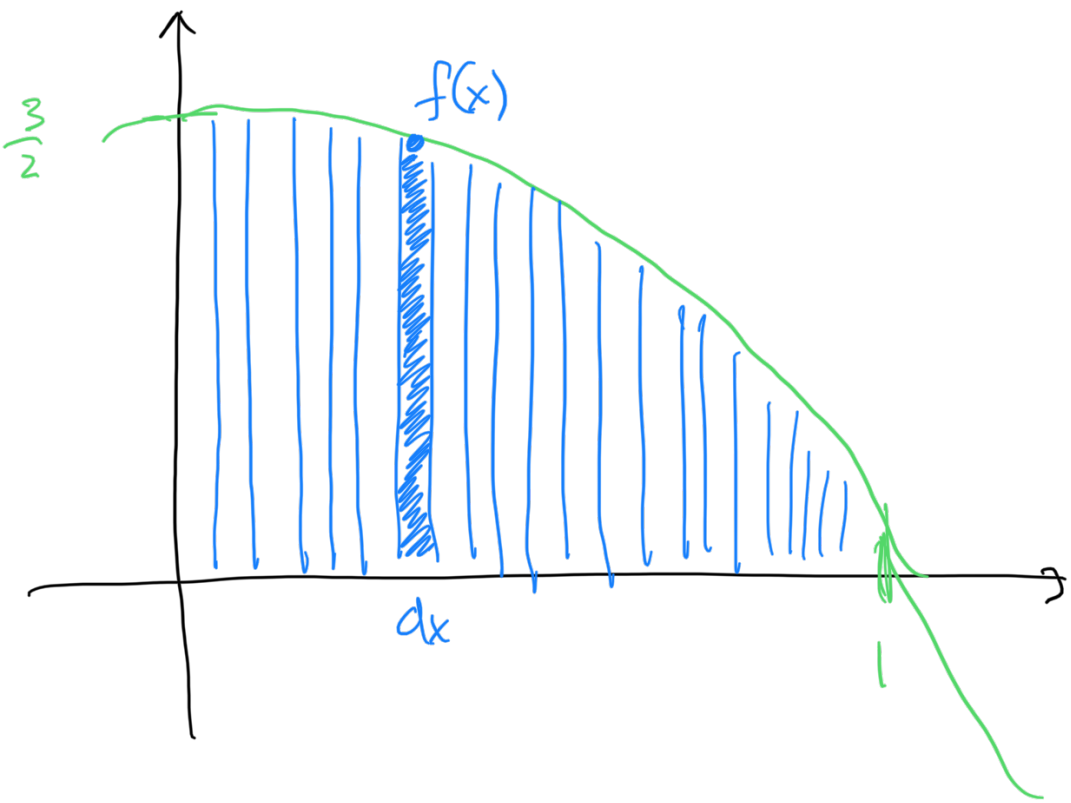
$$\int_0^1 \frac{3}{2}(1-x^2)\,dx = 1$$

$$\left(= \frac{3}{2}x - \frac{1}{2}x^3 \Big|_0^1 \right)$$

$$= \frac{3}{2} - \frac{1}{2} = 1$$

Nice test case, because we can compare our answer to 1

Each [illegible]



$$dA = f(x)\,dx$$

$$A = \sum_{i=1}^{N} dA \qquad \left(\approx \int f(x)\,dx \right)$$

→ Midpoint Method

Analysis of Data From P341

Midterm.

97 students

Bell Curve

35

↳ what do I expect?

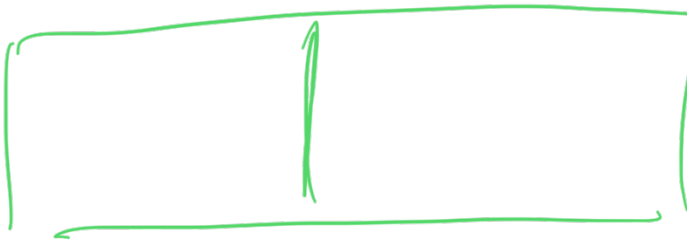
1950 → $\mu = 60\%$, $\sigma = 15\%$

$\mu + \sigma \rightarrow 75\%$

1980 → $\mu = 65\%$, $\sigma = 15\%$

$\mu + \sigma \rightarrow$ 80%

Canadian Grading Scale.



80 87

A- A

400 Engineers → 7

780%

2020

up to -> 90%.

$\bar{x} = 76.6$

$s = 12.5$

"If you do the homework, and understand it, you'll do fine / better on the tests."

?

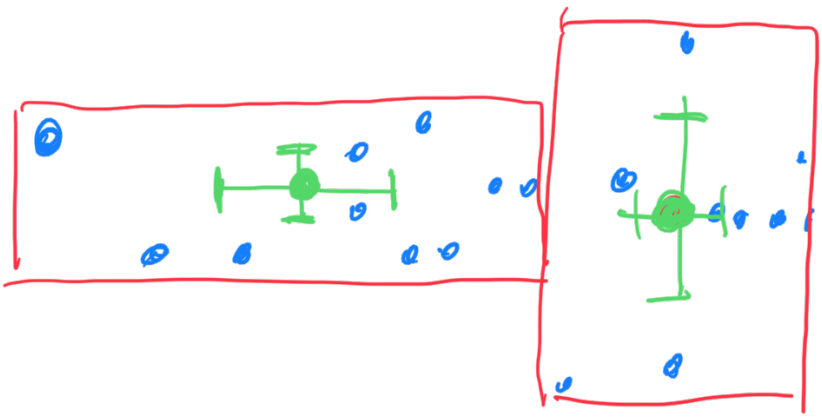
$$\mu_T = \beta_0 + \beta_1 HW$$

Non-linear binning of data.

plt.hist( )

$$\delta_{\mu} = \frac{S}{\sqrt{n}}$$

10 data pts



sumval, sumxval

1st Loop $\bar{x} = \frac{1}{N} \sum_{i=1}^{N} x_i$

sumX
sumV

2nd Loop $S = \sqrt{\frac{1}{N-1} \sum_{i=1}^{N} (x_i - \bar{x})^2}$

RMS !!

97 → prime number :)

9, 9, 9, 99, 9, 9, 9, 9, 7

↑

2nd Year