

# Nálganir

math104-4calc Heildi

Kjartan G. Magnusson, followed by many others

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# Miðpunktsreglan

Reikna skal nálgunargildi  $\int_a^b f(x) dx$ .

Skiptum bilinu í  $n$  jafnstór minni bil.

Setjum  $y_i = f\left(\frac{x_{i-1}+x_i}{2}\right)$  og  $A_i = y_i \cdot \Delta x_i = y_i \cdot h \quad i = 1, 2, \dots, n$

Nálgunargildi:

$$\begin{aligned} \int_a^b f(x) dx &\approx \sum_{i=1}^n A_i \\ &= \sum_{i=1}^n y_i \cdot h \\ &= h(y_1 + y_2 + \dots + y_n) \end{aligned}$$

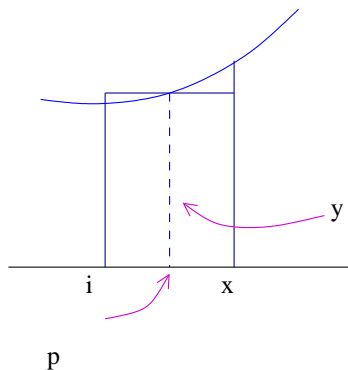
# Trapisureglan

Flatarmál trapisunnar:

$$A_i = \frac{1}{2} (y_{i-1} + y_i) \cdot h \quad i = 1, 2, \dots, n$$

Nálgunargildi:

$$\int_a^b f(x) dx \approx \sum_{i=1}^n A_i = h \sum_{i=1}^n \left( \frac{y_{i-1} + y_i}{2} \right)$$

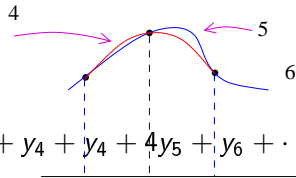


# Regla Simpson

Finnum fleygboga í gegnum punktana  
 $(x_{i-1}, y_{i-1}), (x_i, y_i), (x_{i+1}, y_{i+1})$   
 Nálgu-  
 nargildi:

$$\int_a^b f(x) dx \approx \frac{h}{3} (y_0 + 4y_1 + y_2 + y_2 + 4y_3 + y_4 + y_4 + 4y_5 + y_6 + \dots + y_n)$$

$$= \frac{h}{3} (y_0 + 4y_1 + 2y_2 + 4y_3 + 2y_4 + \dots + 2y_{n-2} + 4y_{n-1} + y_n)$$



## Dæmi

$$\int_0^1 x^2 dx$$

Tökum  $n = 4$ ,  $h = \frac{1}{4}$ .

$$x_0 = 0 \quad x_1 = 0,25 \quad x_2 = 0,50 \quad x_3 = 0,75 \quad x_4 = 1,00$$

Nú má reikna með öllum aðferðunum og bera saman, hver kemst næst rétta gildinu...