

# Lecture 4 Review

- Representation of single & double precision real numbers.
- Either representation has a finite precision.
- Code to determine machine precision for single precision numbers.
- Example of variable declaration (single precision real).
- Example of `for` loop.
- Simple example of a “here document” in shell scripting.

<http://www.cplusplus.com/doc/tutorial/variables.html>

<http://www.cplusplus.com/doc/tutorial/control.html>

# NUMERICAL INTEGRATION

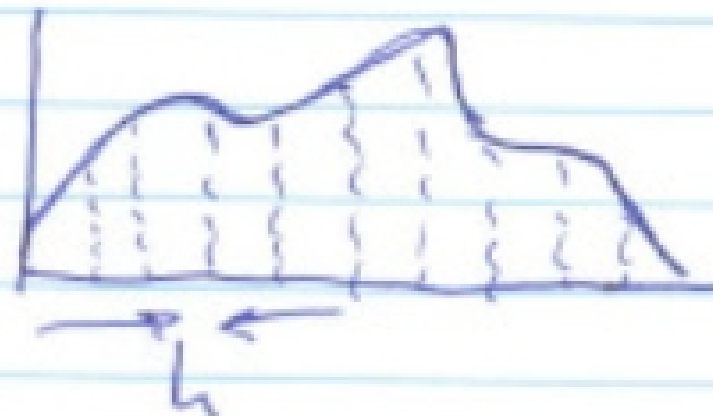
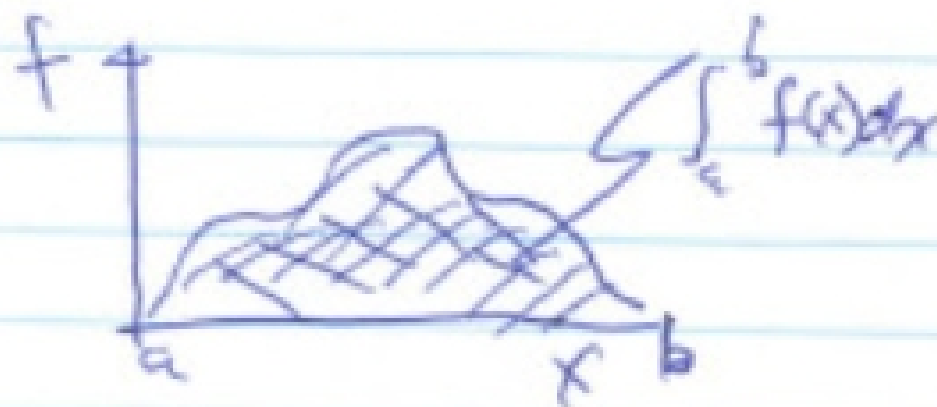
NEED TO PERFORM (NUMERICAL) INTEGRATION

FROM TIME - TO - TIME.

$$\int_a^b f(x) dx = A$$

BASIC TECHNIQUE IS STRAIGHT FORWARD


$$\int_a^b f(x) dx = \lim_{h \rightarrow 0} \left[ h \sum_{i=1}^{(b-a)/h} f(x_i) \right]$$



MANY DIFFERENT INTEGRATION TECHNIQUES.

BASIC IDEA IS TO "SUM OVER BOXES"

MORE ABSTRACTLY, 
$$\int_a^b f(x) dx \approx \sum_{i=1}^N f(x_i) w_i$$

"WEIGHTS" 

ACTUALLY, NO REAL NEED TO HAVE BOXES ALL OF SAME WIDTH. WIDTH CAN VARY.

HOWEVER, LET'S START SIMPLY.

$$h = \frac{b-a}{N-1} \quad \text{BOX WIDTHS ALL EQUAL}$$

$$x_i = a + (i-1)h, \quad i = 1, N$$



WE CONSTRUCT TRAPEZOIDS.