Lecture 23

Tuesday, November 15, 2022 1:13 PM

Questions.

Reminder. $y = f(x)$

$x \longrightarrow x+\Delta x$

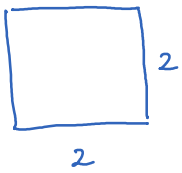
$y \longrightarrow y+\Delta y$

$\Delta y = f(x+\Delta x) - f(x)$: actual change of y

$dy = f'(x)\underbrace{dx}_{\Delta x}$: "linearized" change of y

Practice on the worksheet

Ex



Allowable error for the side length is ± 0.01.

What is the maximum error of the area?

$f(x) = x^2$

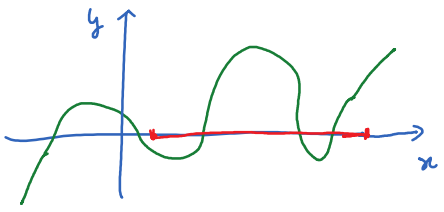
$$\Delta y = f(2+\Delta x) - f(2) = (2+\Delta x)^2 - 2^2 = 4\Delta x + (\Delta x)^2$$
$$\lesssim 4(0.01) + (0.01)^2$$
$$= 0.0401$$

Note that when Δx is small, $(\Delta x)^2$ is much smaller than Δx.

$$\Delta y = 4\Delta x + (\Delta x)^2 \approx 4\Delta x = 4dx = dy$$

Optimization problem

This is the problem of finding min/max of a function.



This function doesn't have min or max. But if we restrict it on an interval

then it has a min and max.

The peaks are called local maximum.

The valleys are called local minimum