ENGG1003 - Monday Week 6

Interpolation, Assignment 1 and Mid-term quiz

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Lecture overview

1. Interpolation
2. Assignment 1
3. Mid-term quiz

The story so far

- variables and data types
- arrays (using `numpy`)
- plotting (using `matplotlib`)
- flow control
  - `if`
  - `while`
  - `for`
- functions

Most of ENGG1003 from here uses these elements of Python to solve Engineering problems

1) Interpolation

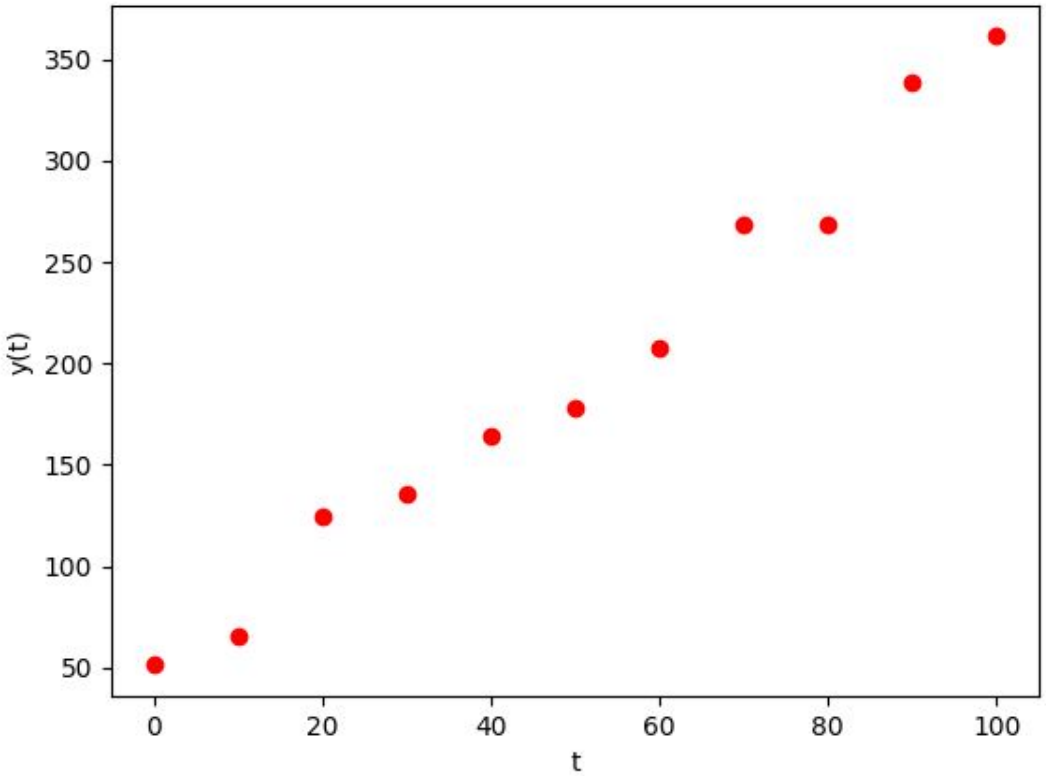
Two common forms of *curve-fitting* in Engineering applications:

1. *interpolation*
   - today's lecture
2. *regression*
   - considered in detail later in ENGG1003

- we now demonstrate both curve-fitting methods applied to the same dataset

Curve-fitting dataset

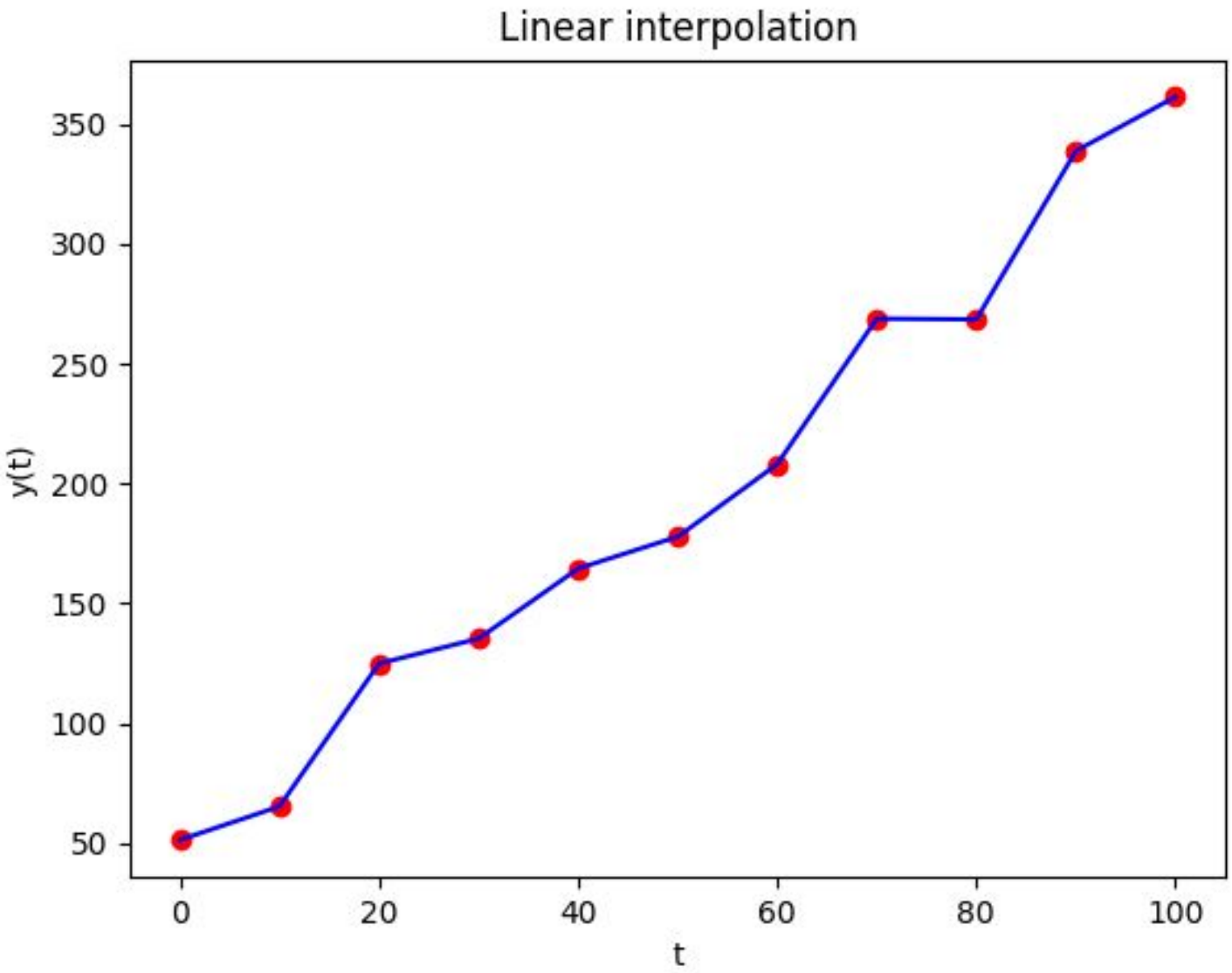
`Week6Mon.py`



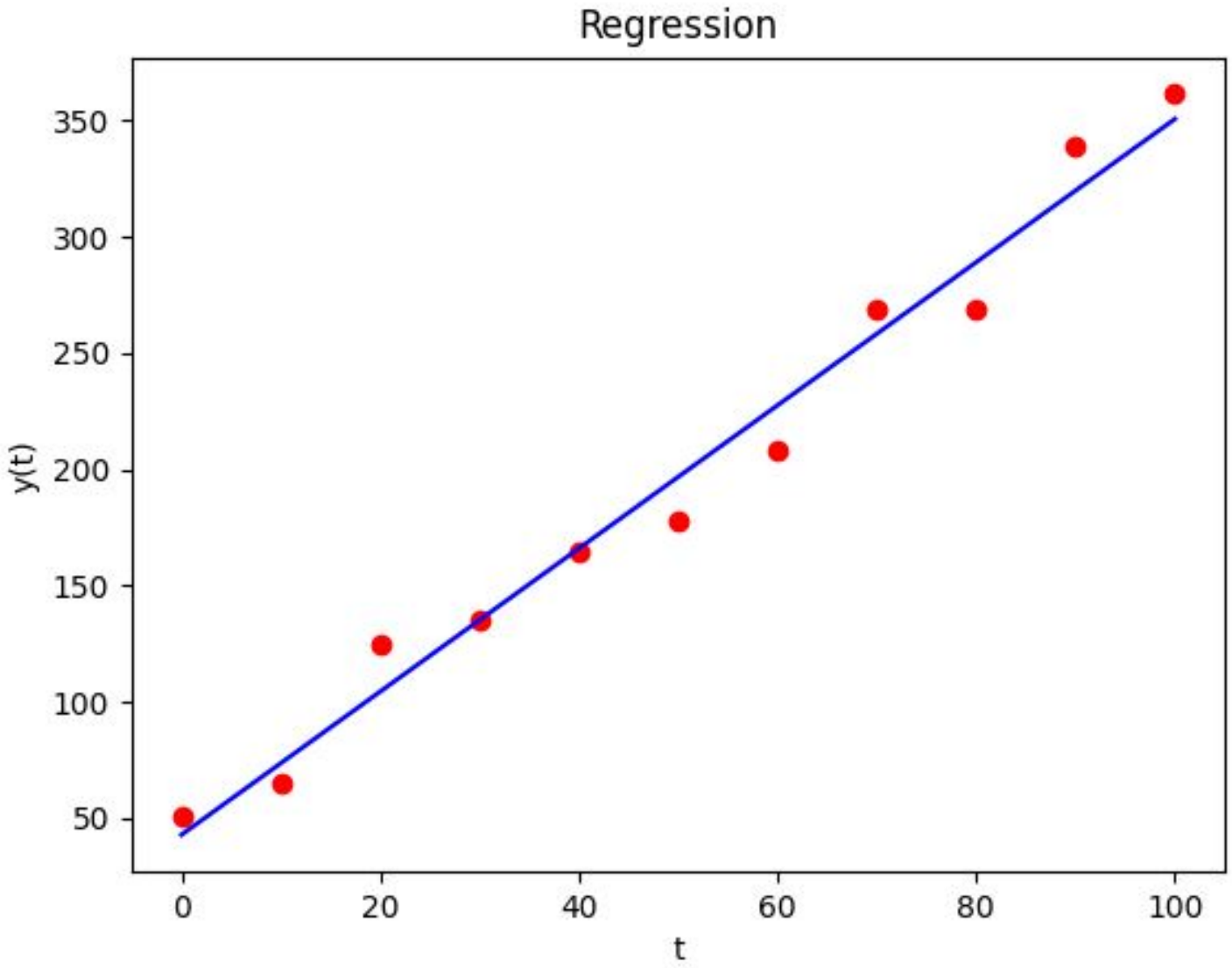
- 11 pairs of data points $(t_i, y_i), i = 0, 1, 2, \ldots, 10$

  $(0, 51.29), (10, 65.24), (20, 124.89), \ldots, (100, 361.32)$

Interpolation



Regression



Interpolation vs. regression

- **interpolation:** joining the dots
  - obtain value of y at some intermediate point
- **regression:** fitting a straight line
  - when there's "too much data", simplify
  - here, simplifying to a straight line
  - will return to choosing "best" straight line later in ENGG1003
- both interpolation & regression involve creating a function (blue line) from data (red dots)

Functions

- review mathematical functions: week 5 Monday lecture, page 3
- function f takes data point x and returns $y = f(x)$
- review in PyCharm

- XXX

- XXX

- XXX

- XXX

- XXX

2) Assignment 1

- key dates: out, due date for submission
- counts for 20% of course grade
- how assessed: in lab, week 7 (after recess)
- the basic ideas behind the lab
- this weeks 2-hr face-face lab:
  - get started on the assignment
  - there isn't a week 6 lab sheet: assignment in place of work sheet

3) Mid-term quiz

- Thursday 1 April, 4–5pm
  - during scheduled lecture time
  - but there will not be any Zoom or YouTube livestream on 1 April
- 40-minute quiz
- open-book
- quiz will appear on BB at 4:15pm
- counts for 15% of course grade
- what you'll be asked

- what you can do to prepare for the quiz
  - read THIS csv— can get started now!
  - you'll be asked to write Python code to do some calculations on a specified column
  - enter your results into BB
  - cut-and-paste code into BB
- can practice NOW in BB
- demo to class in lecture

- XXX

- XXX

Lecture summary

- Interpolation
  - linear interpolation (straight line "join the dots")
  - cubic spline
- Assignment 1
  - xxx
- Mid-term quiz
  - xxx