Electronic marking of electronically submitted coursework

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The Open University

OU Coursework

- Tutor Marked Assignments (TMAs)
- Marked by tutors (!)
- Typically four per 30-credit module

Question 2 – 12 marks

The aim of this question is to assess your understanding of simple line-search methods for finding a local minimizer of a function of two variables, and of how the result depends on the coefficients of the function.

Consider the function

$$f(\mathbf{x}) = 6x_1^4 + 2x_1x_2 + 4x_2^4 + x_2^2 + 3x_1 - 2x_2$$

where $\mathbf{x} = [x_1, x_2]^T$.

(a) Perform, by hand, *one* iteration of the alternating variables method for finding a local minimizer of f, starting from $\mathbf{x}^{(0)} = [0, 0]^T$, and performing the line search analytically. [4]

(b) Use an appropriate Maxima worksheet to find a local minimizer $\boldsymbol{\alpha}$ of f correct to six decimal places, starting from $\mathbf{x}^{(0)} = [0, 0]^T$, with:

(i) the alternating variables method

(ii) the steepest decent method.

Use the golden section search method to perform the line searches.

Comment on the performance of the two methods in locating the local minimizer found. Which method is the most efficient? [3]

(c) Estimate, by hand, the change in the local minimizer $\boldsymbol{\alpha}$, and in the value of $f(\boldsymbol{\alpha})$, if the coefficient of x_1x_2 changes from 2 to 2.1. [5]

Your solution to part (b) should include suitable extracts from Maxima worksheets, showing the problem input and the key results, in addition to an interpretation of the relevant Maxima output.

- Modules usually also have an exam
  - Usually done face-to-face, in a hired hall

Student production of assignments

- Most of the University assumes Word submissions
  - Marked using tracked changes etc
  - (Relaxed last month!)



- Maths and Stats requires students to produce PDF documents
  - Typeset (e.g. LaTeX) [time-consuming]
  - Scanned handwriting
    - Home scanner
    - Smartphone scanner app (Adobe Scan, Microsoft Lens etc)
    - Camera (often worse quality output, large file size)



- Some still submit paper assignments through the post

Student production of assignments

Possible problems (1)

- Illegible scan
  - use dark ink
  - don’t use thin paper
  - don’t use squared paper
- File size too large for submission (10MB @ OU)
  - One handwritten scanned A4 page is approximately
    - 0.7MB scanned (300dpi, colour)
    - 0.3MB Smartphone app
  - File size can be reduced by
    - `smallpdf.com`
    - Print PDF to another PDF using "print to PDF"

Student production of assignments

Possible problems (2)

- Pages upside down, back-to-front, out of order
  - number each page
- No space for comments: requirement to add blank pages
- Provide guidance to students

Submission methods

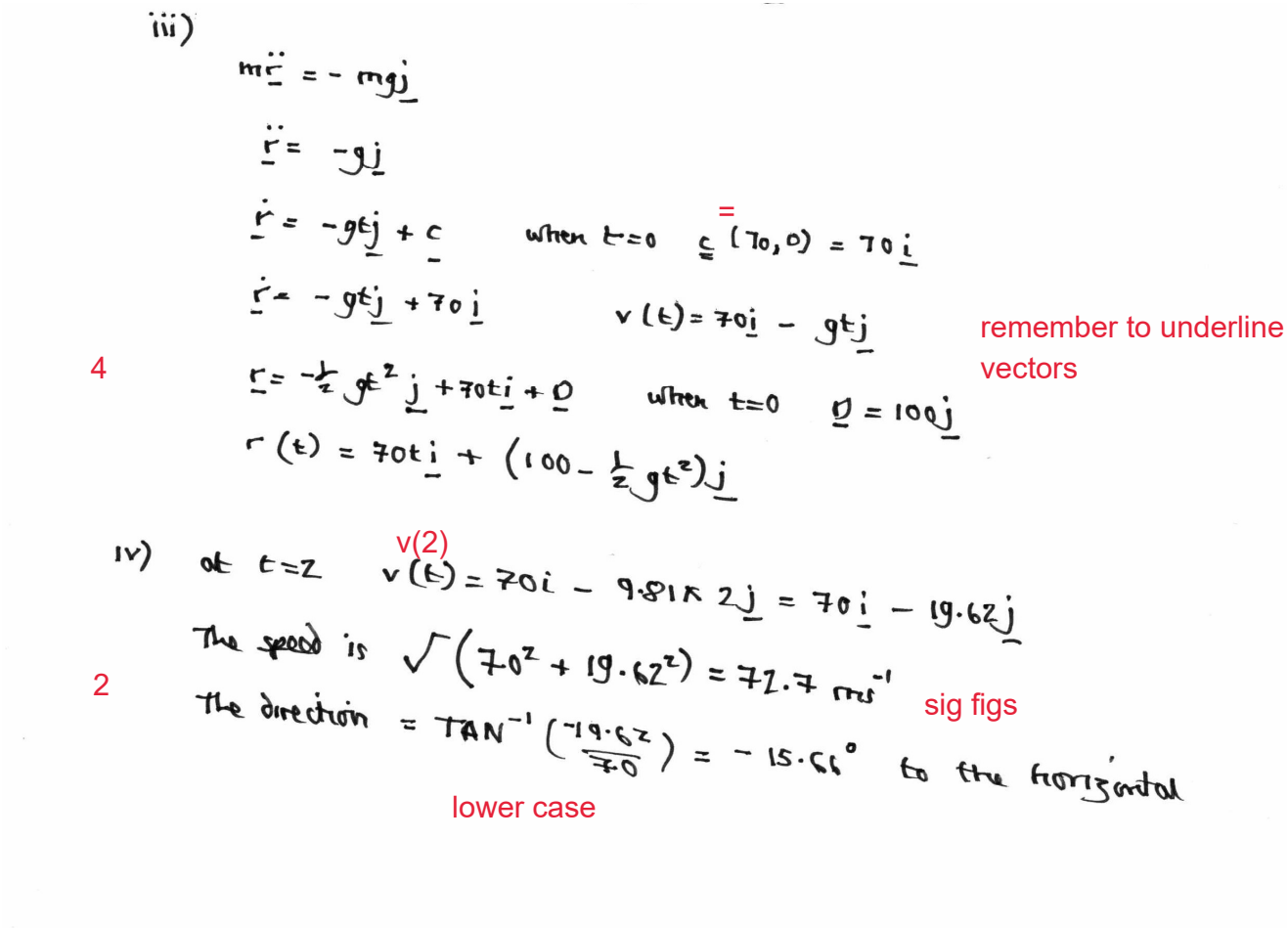
- Email (file size just within typical attachment limits)
- VLE
  - Moodle Assignment module
- Bespoke software
- Commerical solutions
  - WiseFlow
  - Gradescope
  - Turnitin
  - RM
  - . . .

  These often support online, in-browser marking.
  Some support in-page annotation.

Assignment marking

PDF annotation techniques (1)

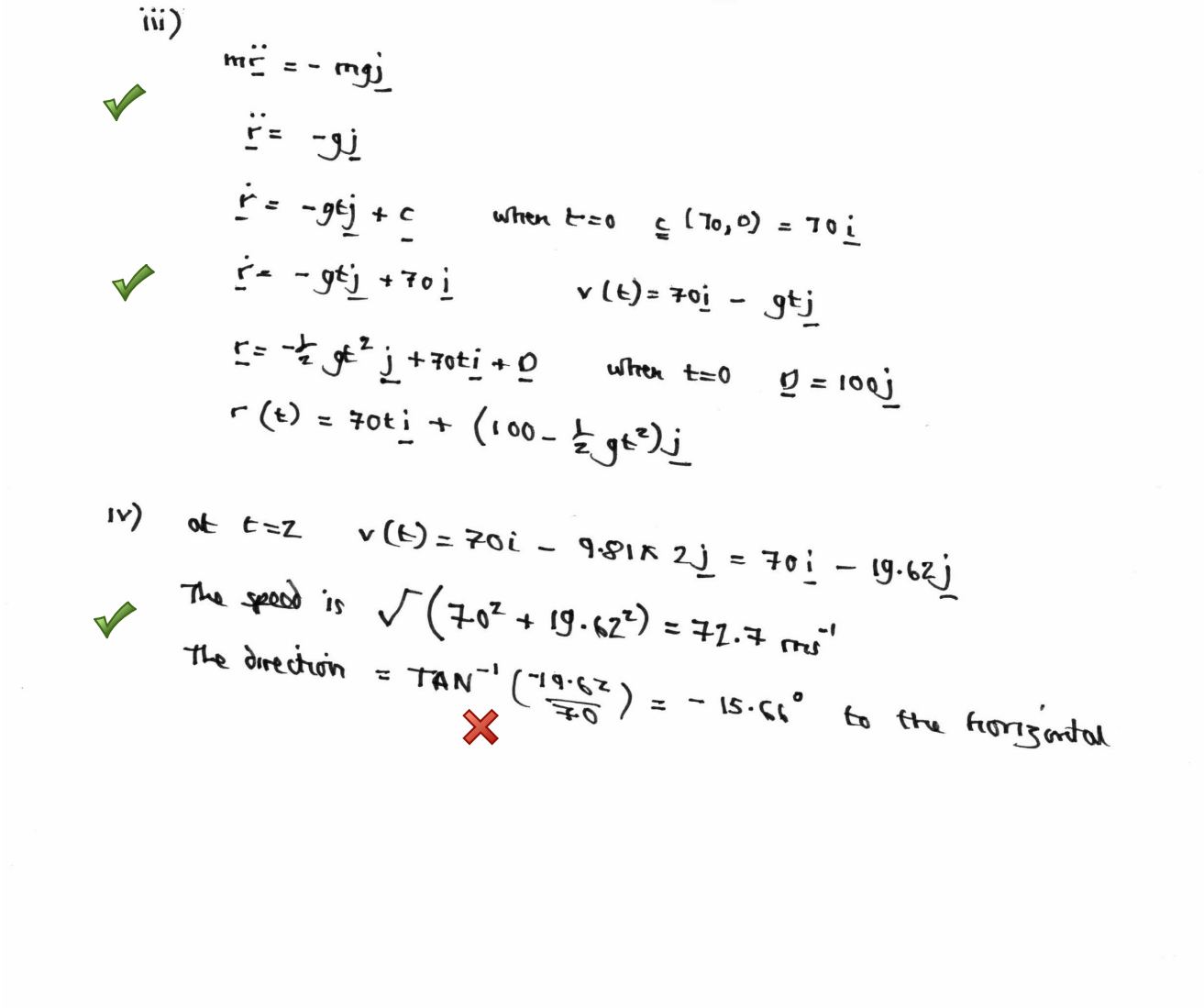
- No (known) systems support typeset maths notation!
- Typed text comments



Assignment marking

PDF annotation techniques (2)

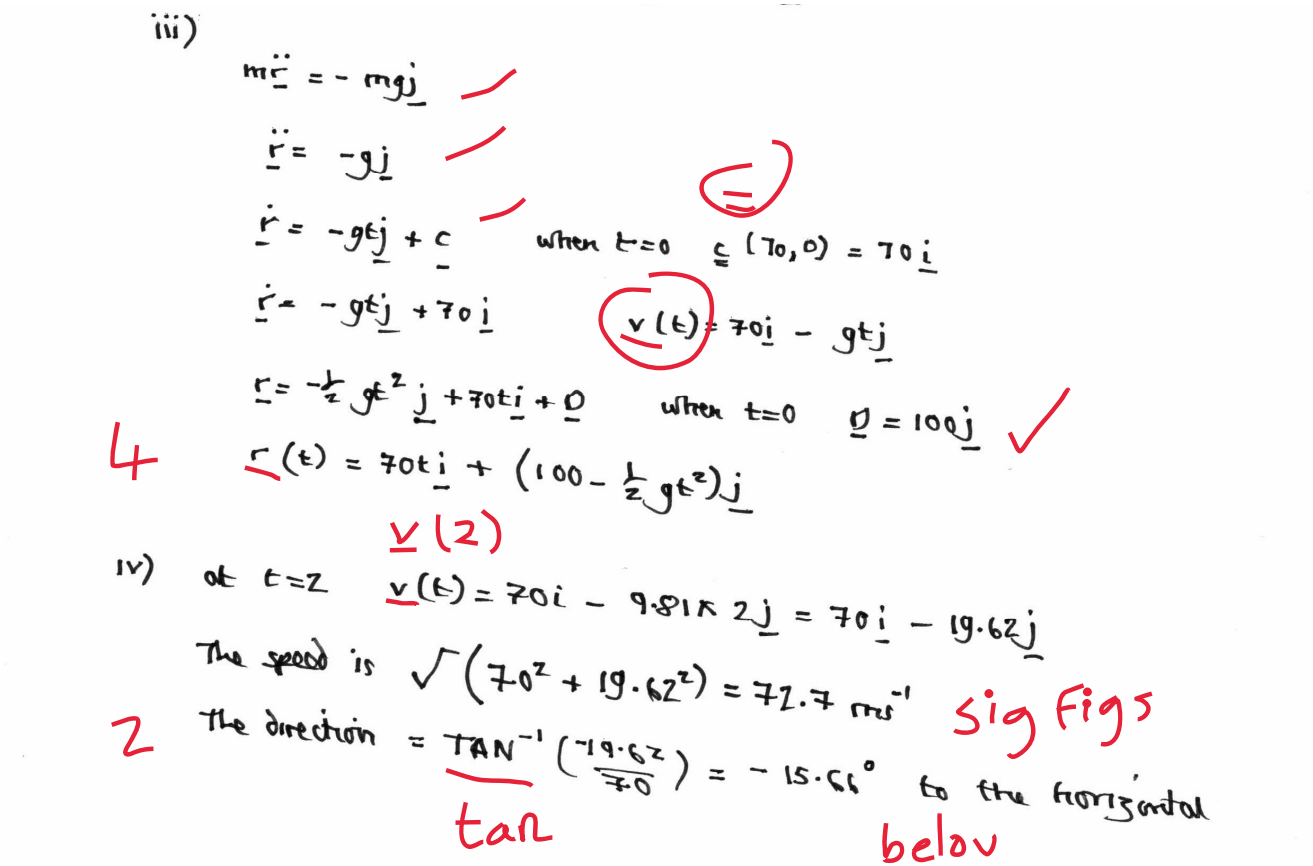
- Stamps



Assignment marking

PDF annotation techniques (3)

- Handwriting



Assignment marking

Handwriting hardware

- Mouse (hard!)



- "Dumb" tablet



- Tablet screen



- Touch screeen computer



- iPad + Mac

Annotation software

(Other solutions are available)

Product	Cost	Text	Stamp	Image	Writing	Page mgmnt
Adobe Reader (comment tool)	£0	✓	✓	×	✓	×
PDF-XChange Viewer (discontinued)	£0	✓	✓	✓	✓	×
PDF-XChange Editor	$44	✓	✓	✓	✓	✓
PDF Annotator	£70	✓	✓	✓	✓	✓

Electronic marking

Advantages

- Overcomes "physical" submission problems
- Can cut-and-paste common comments/use stamps
- Can delete erroneous comments

Disadvantages

- Can take longer

Any questions?

Images: OU/wikicommons/manufacturer's websites



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