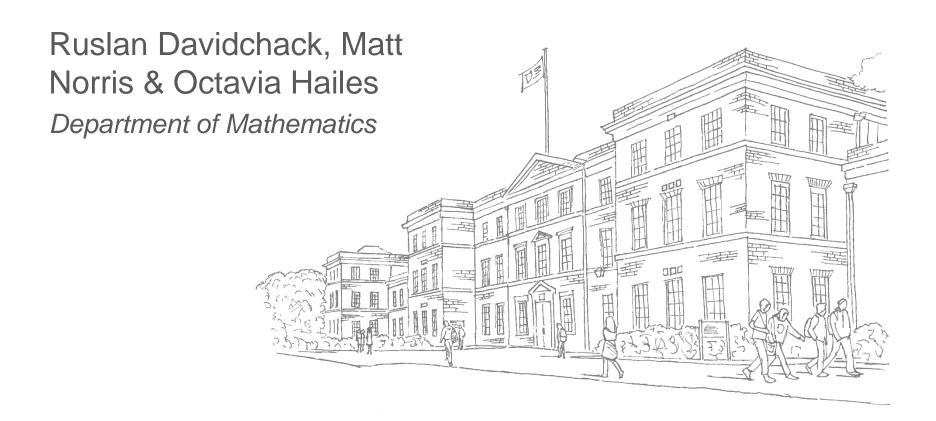


# Electronic submission and marking of handwritten solutions



## Background

#### How it's done now:

- Substantial part of assessment in Mathematics focuses on solving problems.
- Since solutions usually contain many equations, writing them in a word processor is impractical.
- So, students write solutions by hand on sheets of paper, staple them (hopefully), write name, module number, etc. (hopefully), and submit them by dropping in a corresponding box by a specified deadline.
- Solutions are picked up by markers, marked by writing the marks and feedback with a red pen on the solutions, as well as entering marks in a spreadsheet (e.g. Grade Centre on Bb).
- The marked solutions are then distributed to students in a lecture, problem class, seminar, etc.



## Background

#### Drawbacks:

- Students have physically to bring in the solutions to drop them in a box
- Solution may be dropped in a wrong box and eventually lost (no way to verify whether it was actually submitted)
- If not well stapled, the solutions pages may get separated and lost
- If students forgot to write their name or student ID, it may be hard to identify whose work it is
- Returning marked solutions to students is time consuming (especially in big classes)
- Students who happen to be absent in class do not get their marked solutions on time.
- Not 'green'



## **DIP Project Aims and Team**

- 1. Investigate options, determine best practices, and prepare written guidance for students on how to submit their solutions in an electronic form, for example via Blackboard
- 2. Investigate options, determine best practices, and prepare written guidance for markers on how to mark the electronic solutions and return marks and feedback to students in an electronic form

#### Project team:

Digital Advocate: RD

Digital Associates: **Matthew Norris** (2<sup>nd</sup> year BSc Mathematics)

Digital Innovator: **Andy Tonks** (teaches Calculus and Analysis – 1<sup>st</sup> year core

module)

Digital Associate: Octavia Hailes (3rd year BSc Mathematics)

Digital Innovator: **Ed Hall** (teaches Probability and Introduction to Stats – 1<sup>st</sup> year

core modules and Introduction to Computing – 2<sup>nd</sup> year core module)



## Part 1: Submission

Option 1	Ор	Option 2		Option 3		Option 4	
Scanning handwritten work mobile phone scanning ap (Microsoft Lens, Evernote, Adobe Scan)	•	Scanning handwritten work on		Math based software to type solutions (STACK, Wiley Plus, Latex)		Writing tablets (WACOM, iQbe, UGEE Graphics Tablet)	
Pros Cons	Pros	Cons	Pros	Cons	Pros	Cons	
Can do it anywhere (e.g. ill / home)  Sufficiently legible  Lots of variety of apps (same output file needed)  Must scar multiple document (time consuming consuming compress one file may not be available mobile Ostall students haccess to mobile.	Fast, scans all pages in one go  g) Emailed directly to Uni account to  Scans all files in one go e for all Creates one PDF file  Already done		Looks good/ professional  I know students at Loughborough using STACK  Could use LaTeXiT just for equations and import into Word, etc.	Students must get used to typing in a mathematical format  Time consuming  Not much known about it	Quick and easy  Converts text written on tablet straight to PDF file (no 'middle man'/ scanning)	Expensive (£20 - £100 roughly per student)  Requires software on mobile/laptop  Charging required  Variable quality of writing experience	



#### Part 1: Submission

Submission via Blackboard					
Pros	Cons				
Submission code as proof	File size limit (2MB per page)				
Easy to upload one/multiple					
files	No integration with a				
	scanning app so work				
Can restrict file type	cannot be directly scanned				
submission (e.g. Only PDFs	into blackboard				
allowed - making it easier					
for markers)	Students maybe less				
	inclined to come into Uni at				
Midnight deadlines as no	all				
college house restrictions					
No losing marked work					



## Part 2: Marking and Feedback

Option 1			Option 2	Option 3		
Tablet with compatible digital pen  Pros  Cons		exams where fe	ck sheet (similar given for edback is given for how rt did on each question)  Cons	Longer/more detailed feedback sessions (smaller groups)  Pros Cons		
Directly annotate and note on PDFs (Easy to do with built in Drawboard PDF app for Windows 10)  Don't have to carry lots of work about  No chance of losing work (unless files corrupt but can always redownload)	Expensive (Cheaper to provide staff with tablets and let students scan work)  Tedious to mark for whole class and inputting marks into blackboard could be time consuming (Split work between markers – 20 students each?)  Systems could be slow or unresponsive at times  File sizes would be large for large cohort  Marked files would have to be reuploaded to specific accounts	Quicker to do than writing feedback on all work	No specific feedback to students except marks  May get lots of questions from students (Students generally want personal/detailed feedback). Is this evidence based?  One submission file to upload to blackboard with marks given with grade centre	Quick marking; just follow mark scheme and provide marks via Grade Centre  Students get more personal and detailed feedback  Students may be more inclined to come to Uni if this is the only way they get personal feedback	More time consuming for students and feedback leaders We don't see that it is more time consuming for students. Although timetabling may be an issue.	



## Part 2: Marking and Feedback

Marking and Feedback via Blackboard					
Pros	Cons				
Can download all work as a zip file	No integration with PDF editors;				
instead of separately	must download all files then mark				
	individually and reupload. Would				
Lecturers already comfortable with	be easier if you could click a				
Blackboard platform	name, the students work appears,				
	can then be marked/annotated				
Integrated comments and marks	and then reuploaded with one				
section	click when finished.				
	Technical errors may cause				
	submissions to fail or get				
	corrupted (back ups needed?)				



## Resources and examples

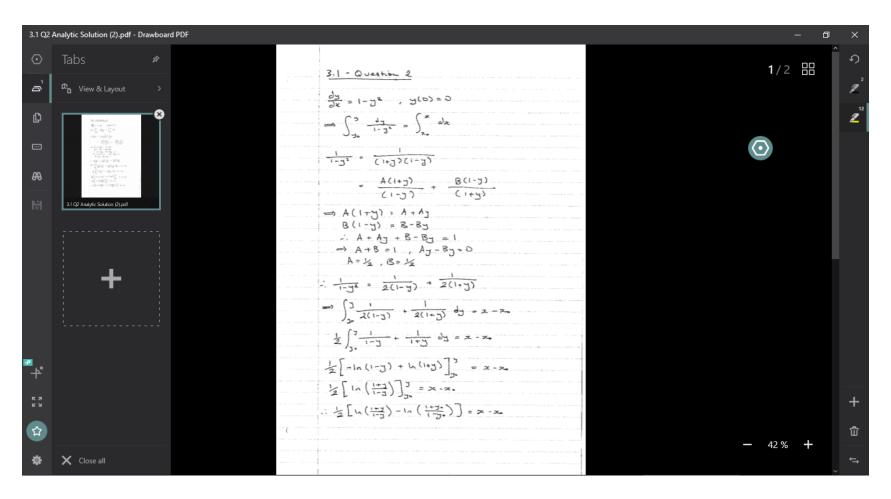
### Best scanning apps

Product	Abbyy FineScanner	Dropbox Business	Evernote Scannable (for iPhone)  - or grade from the first of the firs	Genius Scan Plus	Adobe Scan (for iPhone)	Intsig CamScanner	Microsoft Office Lens (for Android)	ScanBot  Scanbot	Shoeboxed	TurboScan
Lowest Price										
Editors' Rating	EC EDITORS?	EC EDETORS?	EC EDITORS	••••	••••	••••	••••	••••	••••	••••
Captures Business Cards	~	_	~	_	-	~	~	~	~	_
Captures Text	<b>✓</b>	~	~	~	~	~	~	<b>✓</b>	-	_
Captures Multi- Page Docs	~	~	_	~	~	~	-	~	-	~
Captures Photos	_	~	~	~	~	_	~	~	_	~
Fax Capability	_	_	_	~	_	~	_	_	_	_
Prints from App	~	_	~	~	_	~	_	~	~	<b>~</b>
Includes OCR	~	_	~	_	~	~	~	~	~	_
Annotates Images	_	~	_	~	~	~	_	~	<b>✓</b>	_
Read Review	Abbyy FineScanner Review	Dropbox Business Review	Evernote Scannable (for iPhone) Review	Genius Scan Plus Review	Adobe Scan (for iPhone) Review	Intsig CamScanner Review	Microsoft Office Lens (for Android) Review	ScanBot Review	Shoeboxed Review	TurboScan Review



## Resources and examples

#### **Example of University scanner**





## Next steps

- Discuss and identify best options (before mid-May)
- Draft guidance for submission and marking/feedback, circulate among staff and students, gather feedback (before end of May)
- Finalise the guidance, present project results (June)
- Introduce electronic submission/marking in 2018/19 in Year 1 (compulsory), and Years 2-4 (as an option).



