some notes on recording lectures for remote instruction

Based on polling students in my Math 22A (Linear Algebra) class, Summer Session 2 (2020), they indicated that they preferred lectures which have been pre-recorded on a tablet, rather than videoed at a chalkboard, as it's easier to see what's going on.

I've found the iPad screen recording feature to work very well for recording lectures. If the screen recording button isn't already in the control center (swipe down from the top right of the screen to access the control center), then you can add it from the control center tab under settings. Holding the screen recording button for a second or so gives a pop-up window, where you can turn the microphone on so that it records your voice as well as the screen. (Warning: I've found the microphone to be rather sensitive, so it's helpful to have a quiet place to record lectures.) It'll then count down for 3 seconds before recording. A red dot appears in the upper right corner of the screen when it's recording, and you'll tap this icon to stop the screen recording.

What I like about this system is that, if I make an error, then I can immediately stop the recording and start a new recording. I then know that all errors are at the end of a recording, and this has made it (a lot) easier to edit out the errors (see the notes on editing movies, below). It also doesn't rely on an internet connection, so I can still record lectures if my internet is down, and just upload them when the internet connection is available.

The screen recordings are automatically saved to the Photos app on the iPad. From there, I've been transferring them to my MacBook, and editing the files in QuickTime Player. One way to transfer the recordings to a Mac is to connect the iPad via USB cable to the Mac, open the Photos app on the Mac, select the iPad from the sidebar, select the screen recordings, and then import them to the photos library. From there, you can save the videos to an external folder by going to File -> Export -> Export Unmodified Original. (Choosing Export Unmodified Original saves the original movie file rather than compressing it, and it transfers the files a lot faster than choosing the Export option.) There are likely other methods to transfer the files, but this has worked well for me (and it avoids the use of internet, which is especially helpful for those of us who have an unreliable internet connection).

In QuickTime, I can open each video file and use the Edit -> Trim command to cut out any errors at the end of a video. I've found it to be fastest to label each of these edited video clips as Trim 1, Trim 2, and so on. Then, I can use the Edit -> Add Clip To End command to splice these video clips together, into longer videos.

I've been typesetting my lecture notes in TeX, saving them as PDFs, then transferring them to my iPad and opening the file in the Books app. I can then use a stylus to annotate the notes, e.g. to highlight key words in a definition or ideas in a theorem, or point to things in a worked example. Blank pages in a PDF work well for hand-written notes or examples. The screen recording feature works in any app, but Books is already included on the iPad so it avoids the need to obtain another app.

I've been informed that some colors aren't visible on some students' computers, e.g. light green, so I've started using different shades of blue for highlighting and annotating the notes.

Students seem to prefer shorter videos (e.g. 5-20 minutes) to longer videos, so I've broken each day's lecture notes into shorter sections, which correspond to one topic so that there's a good place to break between the parts of that day's lecture video.

Once the lecture videos have been edited, I've uploaded them to Aggie Video (https://video.ucdavis.edu). After signing in, select Media Upload from the Add New tab on the upper right corner of the window. Select the video files to upload when prompted. Setting the videos to Unlisted will allow students to access the videos only through the link you provide them on Canvas (they won't be able to access the videos if you leave the default setting, which is Private, and anyone can access them if you select Public). Then click Save, so that the change from Private to Unlisted is saved.

In Canvas, there are multiple options for adding videos to a class page, but the one that seems to work best (and the one which is described in the Aggie Video help guide) is to upload them under the Pages tab on Canvas. Once on this tab, select

"+ Page." Put a title for your video clip in the title section. Then, in the rich content editor below the title section, there's a "V" symbol, which says "More External Tools" when you mouse over it. Click on this, and select "Embed Kaltura Media." This gives a pop-up window, from which you can select media that you've uploaded to Aggie Video. Once you've selected the media, click Save & Publish for that page.

The Aggie Video help guide recommends that you don't embed more than three videos in one page, due to extended load times. I've been doing one clip per page, and labeling each page as Lecture i Part j, and so on.

Also, if you insert a video into a page on Canvas shortly after uploading it to Aggie Video, you may get a "processing media" message when trying to view the video. This just means Aggie Video is still processing what you've uploaded, and it should disappear in a few minutes or so.

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I owe a very big thank you to Duane Kouba, Rohit Thomas, and Becca Thomases for their very helpful advice, and for multiple conversations about teaching remotely and recording lectures! The above ideas are a compilation of suggestions I've received, and I've also added a few things that have worked well for me, based on the technology equipment I have, and working around unreliable internet.

Any questions or comments on this document are very much welcomed!
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