Spaced Repetition App for OpenStax Math Textbooks

Proposal by Lucas Dimoveo

Introduction and Market Comparisons

The Curve of Forgetting was first identified in Memory: A Contribution to Experimental Psychology by Hermann Ebbinghaus in the early 1900s. Ebbinghaus hypothesized that there is a roughly inverse-logarithmic decay of information after an individual has learned a particular subject. This means that a memory of learning, for example, how to do a particular mathematical computation can be considered at 100 percent on the same day of learning the technique, and will fall to roughly 0 percent after a week without practicing the learned technique. Ebbinghaus and other memory researchers have proposed a spaced repetition method to actively combat memory decay.

The Spaced Repetition App will apply to the OpenStax open source textbooks for the Calculus series. This tool will help students retain information learned in class that will go on to be used to achieve higher grades and be more productive in internship positions.

There are many spaced repetition applications such as Anki, Quizlet, Brainscape, Picmonic, Synap, Course Hero, and others. Their primary focus is on language learning, history, and medicine. There are online math and programming problem sets that exist such as Khan Academy and CodeWars, but they are not responsive to what the user may or may not already know, and are not designed with memory upkeep in mind.

Features

The focus will be on a single textbook to limit the scope and complexity of the application. Figure 1 represents the home page that the user will land on. Each blue-gray box represents the textbooks available to the user. The user will be able to click on the available textbook, which will bring them to a table of contents for the selected textbook.

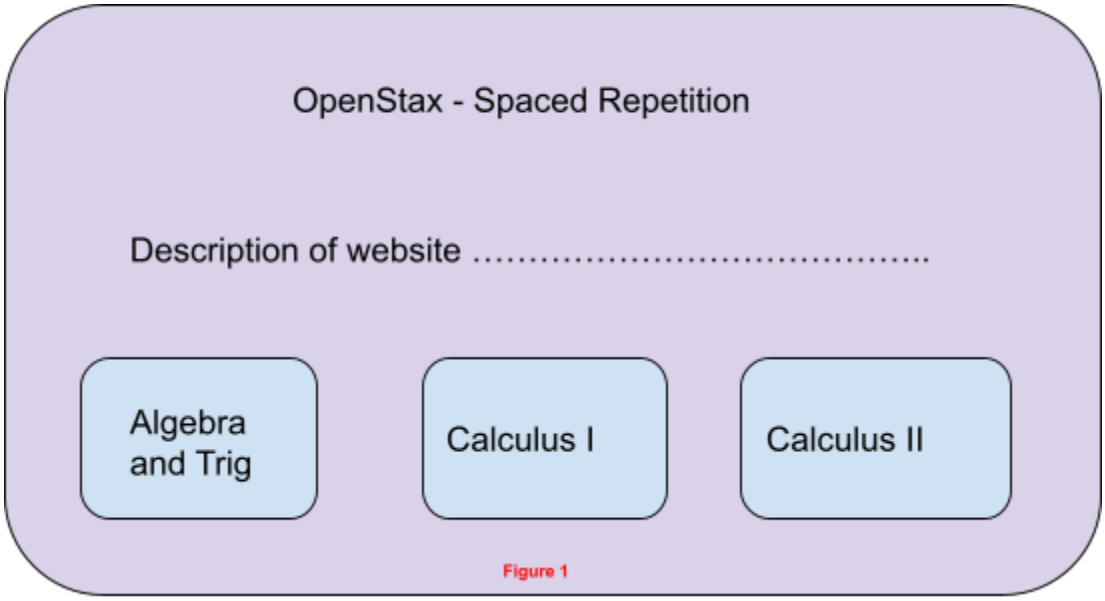

Figure 1

The figure 2 is an example for Openstax's Calculus I textbook in the application. Hyperlinks in the chapter heading (for example: Chapter 1: Functions and Graphs) will take the user to the online textbook. If the user clicks a section (for example: 1.1: Review of Functions) they will be asked if they have completed the section. Selecting "Yes" will bring the user to a list of completed sections, a table with the date they completed the topic, and a spacing of dates they will have to adhere to. Current dates will be highlighted as a visual cue to the user that they should be practicing the material on that day. This is represented in figure 3.

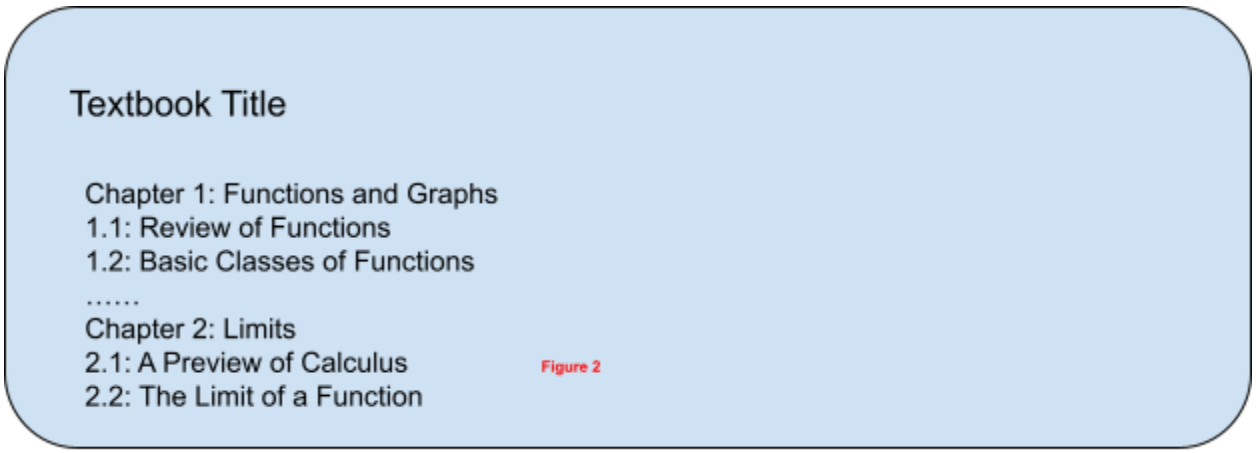

Figure 2

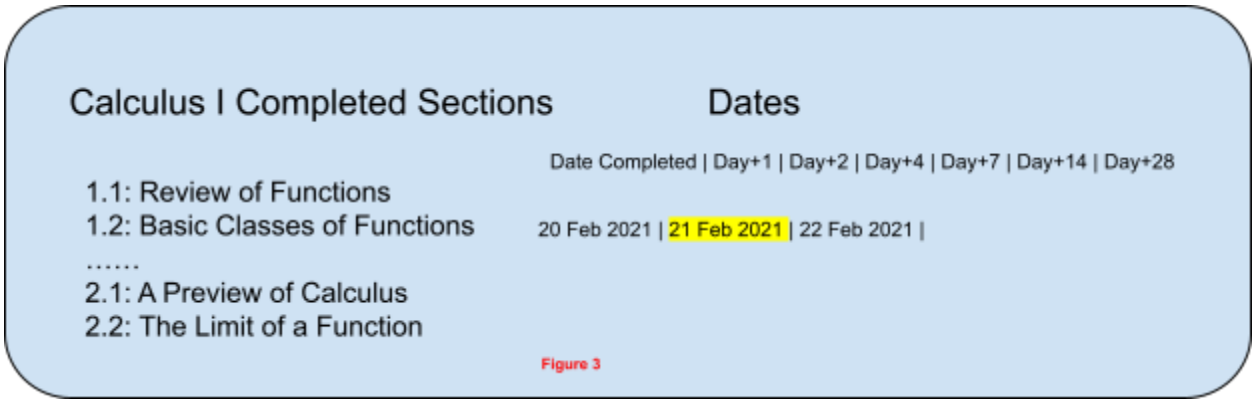

Figure 3

There are further features that can be added to this website such as e-mail reminders with a to-do list, a webpage with the daily total to-do list taken from the dates table, suggestions on what problems to do, and so on. Despite this, I believe that this project will be of use to the self-taught mathematics learner or to community college professors that use these textbooks.

References

How I use Anki to learn mathematics - LessWrong. (2016, December 7). LessWrong. https://www.lesswrong.com/posts/8ZugMc4E5959Xh86i/how-i-use-anki-to-learn-mathematics

OpenStax. (n.d.). OpenStax. https://openstax.org/subjects/math

Using spaced repetition systems to see through a piece of mathematics. (2019, January 12). Cognitive Medium. http://cognitivemedium.com/srs-mathematics

Wikipedia contributors. (2021a, January 31). *Forgetting curve*. Wikipedia. https://en.wikipedia.org/wiki/Forgetting_curve

Wikipedia contributors. (2021b, February 19). *Spaced repetition*. Wikipedia. https://en.wikipedia.org/wiki/Spaced_repetition