Google Docs and Mathematics
Melinda Connon June 2012

Google Docs is a free service from Google. You do not have to have a Google email account to use the document service. However, Earlham has a special educational account so that Google is our email provider as well as a document sharing service. For the most part, it is more stable than our previous server. All of our students can share documents in a fairly closed community. Create an account: https://docs.google.com

Google Documents (word processing, spreadsheet, web-design, presentation software, etc.) are shareable documents with software in the “cloud”. Because it is free, it has limitations and after using Microsoft products for almost 20 years, I was not happy about the change in the beginning, but have found it useful for some items. It is not my choice for writing tests, handouts (other than this one) or statistics. I have been quite satisfied with the “Sites” feature when I had to generate a new webpage in just a couple of weeks.

1. The document program has an equation editor, so that you don’t have to purchase MathType. I liked it better when it was more LaTeX (math/science typesetting language) friendly, but it still serves the purpose most of the time. For example:

\[ ax^2 + bx + c = 0 \Rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

2. Graphs can be imported from other sources – calculator, GeoGebra, CPMP-Tools, Wolfram|Alpha, Grapher, etc.

Image:
3. Comments can be made so that students can revise their work.

4. Students can work on the same document simultaneously. However, working on separate pages at the same time does not work well (or too many people at a time).

10. \( A1: \cos x + \sin x \tan x = \sec x \)

\[
\frac{\cos x + \sin x \tan x}{\sec x} = \frac{1}{\cos x} \\
\frac{\cos x}{\cos x} + \frac{\sin x}{\cos x} \cdot \frac{\cos x}{\cos x} = \frac{1}{\cos x} \cdot \frac{1}{\cos x} \\
\frac{1}{\cos x} = \frac{1}{\cos x} \quad \text{OK-Melinda Connon 4/11 10:45 AM}
\]

11. \( \sec^2 x \tan x = \sec x \cdot \tan x \cdot \sec x \)

\[
(1 + \cos^2 x) \div (\sin x + \cos x) = (1 + \cos x) \times (1 + \sin x) \\
(1 + \cos^2 x) \times (\cos x + \sin x) = (1 + \cos x) \times (1 + \sin x) \quad \text{multiply by the reciprocal, then cross multiply and cosines cancel leaving one cosine on the bottom} \\
\frac{1}{\cos x} \div (1 + \sin x) = (1 + \cos x) \div (1 + \sin x) \quad \text{simplify OK-Melinda Connon 4/11 12:09 PM}
\]

5. The history of editing is documented, so you can see who contributed which portions and when.

6. It saves frequently, so material isn’t lost when a machine crashes or the power goes out.

7. If you only need exponents or subscripts you can use Command/Ctrl + . or ,

Assignments/Assessments

1. Precalculus Journals: exploration/labs and chapter summaries. I don’t have a good rubric for this yet. I may work on finding more specific questions like I used for calculus this year. This might be a good place for questions like the Precalculus Concepts
Assessment (Marilyn Carlson, Michael Oehrtman, and Nicole Engelke).

2. Calculus Journals: one conceptual question per lesson (Larson, Calculus with Early Transcendentals). We dialogue through GoogleDocs and students will earn full credit if all are revised by the time of the test.

3. Precalculus Proofs: I have a set of 55 proofs divided into 5 categories of building difficulty. Each student must do one proof in each category -- first come, first serve. If they start early, they may revise based on hints from me or other students until the day of the test.

4. Precalculus Extrema Problems: I have 34 extrema problems that I randomly divide between my students. It might be more fair if I grouped them before assigning them three. Again, students who start early may revise until the day of the test with comments.

12. A farmer wants to make a rectangular enclosure using a wall as one side and 120 m of fencing for the other three sides.

\[ \begin{align*}
\text{Wall} & \\
X & X \\
120 - 2x & \\
a. \text{Express the area in terms of } x \text{ and state the domain of the area function.} \\
120 = y + 2x \\
120 - 2x = y \\
b. \text{Find the value of } x \text{ that gives the greatest area.} \\
A &= lw \\
A &= (120 - 2x) 2x \\
A &= 120 - 4x^2 \\
\text{Max Area} &= 120 \\
\end{align*} \]

[http://preview.tinyurl.com/dy88afn](http://preview.tinyurl.com/dy88afn)