

Journal of Chelsie Wollett for Spring 2007

Chelsie Wollett

April 9, 2007

1 Week of March 25, 2007

1.1 Began work of 2nd Equation

This week I met all members of the group and got the overall goals for the quarter. Adrian showed me how to use the PCTeX program, and I looked at some possible programs to put on my laptop. The three undergrads began work on the Lemma 1 equation from the article:

$$s(A + B) = \frac{s(A) + s(B + \beta - \alpha)}{s(\beta - \alpha)} + \frac{s(A + \alpha - \beta)s(B)}{s(\alpha - \beta)}. \quad (1)$$

We tried following the geometric proof from the sheet, but have yet to get the identity to come out 100%.

2 Week of April 1, 2007

2.1 Fixed Bio and Continued work on Equation

This week I updated my autobiography so that it could be put on the website. I also learned a little more about the L^AT_EX program and was able to find and download a program to work at home instead of just on campus. The undergraduate project continued. We tried using a lot of trig functions to substitute the angles in the equation from last week. We thought it might have to get ugly before it got pretty and worked out. However, what we ended up with was really just a mess, and nothing cancels out like we had hoped.

3 Week of April 8, 2007

3.1 Finally solved our First Task

The identity for $\sin(A + B)$ was finally shown geometrically this week. We were trying to use all these area equations, when all we needed was a way to compare sides using law of sines. We also spent a little time trying to figure

out how solving this equation, and geometrically at that, ties in with the Curse of Dimensionality that we have talked about during full group discussions. We dove into the identity for sine of a sum of three angles. We started off using law of sines this time, but we are not sure that we have all the angles in the right place for things to cancel out like they did with two angles.

4 Week of April 15, 2007

4.1 Worked on sine of Three Angles

This week we continued work on:

$$\begin{aligned} s(x + y + z) &= s(x) \frac{s(y + \theta)}{s(\theta)} \frac{s(z + \phi)}{s(\phi)} \\ &\quad + \frac{s(x - \theta)}{s(-\theta)} s(y) \frac{s(z + \phi - \theta)}{s(\phi - \theta)} \\ &\quad + \frac{s(x - \phi)}{s(-\phi)} \frac{s(y + \theta - \phi)}{s(\theta - \phi)} s(z). \end{aligned} \tag{2}$$

We read the induction proof, and are sure it has to work, but we are unable to find a drawing that gives us all the necessary angles. We have tried two different drawings, but we always end up with an angle that has both y and z in it and we only need one or the other.

5 Week of April 22, 2007

5.1 Looked at the Induction form of the Proof

We began the week by going over the equation's general induction proof. This didn't really get us anywhere geometrically though. We again tried different pictures to get all the necessary angles, but have yet to find it. Cody and I tried to put the induction proof into concrete terms using three angles, and we understand how all the terms come out, but we do not know how to get that to correspond to a picture.

6 Week of April 29, 2007

6.1 Found a Picture for Sum of Three Angles

I've been obsessed with thinking that we had to use about 15-18 angles, which would mean we would need about 6 triangles. I messed around last week with different ways to get the angles, and found that certain angles had certain parameters in common: θ is in both the x and y triangles, ϕ is in the x and z triangles, and $\phi - \theta$ is in the y and z triangles. I could get every angle that we needed in three separate triangles, all with a sum of two angles. Friday in the

group meeting, we were all trying out different pictures, and finally came up with one that put the 6 triangles together in one picture.

7 Week of May 6,2007

7.1 Back to Induction

We started off again looking at triangles, but then decided that had gotten us nowhere thus far, and decided to scrap that idea. We instead tried to work on things that we already knew. We used the same triangle as the sum of two angles proof, and made $A = (x + y)$ and $B = z$. During our time we found that we could easily get the first and third terms needed from that, however, the second term was absent. At home, I messed around with what was leftover after you got the first and third terms, and found that you get the second term with two other terms that cancel each other out. So this method seems to work.

8 Week of May 13, 2007

8.1 Pictures and Four Terms

During our meeting Friday, we found a picture that seems to work for three angles. We are not sure if it is the correct picture for the induction we are doing because reproducing it for four is not working out so well. We also tried to do the induction proof for four angles, but we are unable to cancel things again, like last time. We have all four terms, and the leftover terms are not really similar at all.

9 Week of May 20, 2007

9.1 Finalizing

This week during our meeting we did two main things. First off, we tried doing the induction idea for four terms using the equation we knew for three angles, instead of two. This may be the better way to go, because in induction you know the previous step and you want to prove the one right after. However, this says you know the previous term, while I am not 100% sure you always will. Secondly, we did a little talking about what all we had covered during the quarter for the presentation on Wednesday.

10 Week of May 27, 2007

10.1 Presentation

We put together a presentation to give to the entire group Wednesday. We tried to cover all the bases, to show how our research fit in with everyone else's. We

might have explained a little more than necessary on some parts, but we wanted to make sure everyone understood what our goals were. Many times during some exploratory and RA presentations this quarter, I felt lost. I had basically no idea what they were talking about. Our last task together was to put together a final summary of all we covered in report format. We then each added our own reflections on how we felt about the project and any improvements that could be made if it is done again.