Pablo Agustín Nava Vieyra

Mathematician and B.Sc. in Nanotechnology

Zapopan, Jalisco, Mex.

(+52) 33 3485 4019

bit.ly/Pablo-portfolio

pablonavavieyra@hotmail.com

AWARDS AND RECOGNITIONS

From elementary school I developed a close and fond relationship with mathematics. I found (and still find) exciting how all correct paths take you to Rome, how math is so consistent and started reading a lot on the subject. However, what really made me love the discipline was the experience of going to various math contests and trainings over middle-high school and high school. Especially due to the people. I made great friends and got to know some amazing teachers that lead me to have a closer look at all the depth and creativity involved in discovering, creating, understanding and explaining mathematical concepts. And I am very excited that I still have that passion even after a decade. Below is a small review of the achievements gathered.

High school

Sixth best score of the CENEVAL test nationwide:
1288/1300 *October 2015*

ITESM International Sciences Competition
Competitor in Physics (19th place) and Mathematics
February 2015

National Pierre Fermat Mathematics Contest
Finalist *September 2014*

27th & 28th Statal Mathematics Olympiad for high school students
First place *June 2013 and 2014*

Statal Physics Olympiad for high school students
Third place *June 2013*

Middle high school

Participant of UNIVA's XVI Regional Math Contest by teams *September 2011*

25th Statal Mathematics Olympiad for high school students
Third place *Junio 2011*

11th Statal Mathematics Olympiad for middle school students
Second place *December 2010 - 3rd Level*

National Math Contest Pierre Fermat
Second Place (State level) *June 2010 - 2nd Level*

15th & 16th Spring Competition Math
Second place (national level, both)
April 2010 & June 2011 - 2nd Level

COMPUTATIONAL GEOMETRY AND MODELING PROJECTS

Over the years I have worked in several modeling projects, some more artistic other more related to finance and real-world applications. Here's a small selection of some of my favorite projects I worked for fun. Unfortunately, I didn't save all the small projects I made in Python; I just have these ones in Desmos. However, I'm working in some interesting programs in Python and Matlab, while I'm still on my job search.

The brachistochrone curve - https://www.desmos.com/calculator/aw8ubayaxw

While taking Calculus of variations in Classical Mechanics we needed to make some real models of the brachistochrone curve. I decided to make a virtual model to compare it to the physical one and see the difference in performance. This curve has some interesting properties that are shown in this video: https://youtu.be/-H7CzIGcQk4.

The parameter a is the radius of the circle making the cycloid and defining the final point B. The parameter t_1 controls the animation of the ball falling, and the variable T shows the total time depending on the size of the curve.

Hypercube - https://www.desmos.com/calculator/3qnxg63zqc

I wanted to make some presentation cards for my work as a tutor, so I sketched a logo and two options in background. I decided onto the first option as it was cleaner. It was made only analytic geometry and several lineal equations.

Graphic representation of the Gaussian and Student's t distributions - https://www.desmos.com/calculator/cchjuidrnr

When taking my course in analytical statistics applied to business, I wanted to share with classmates and pupils the visual representation of these two distributions, and have a more intuitive feel on what does the mean (m) and standard deviation (o) imply. It also lets me get the area behind the curve on any interval without needing to resort to a displaced erf function.

You can also check that as the degrees of freedom (v) on the t-distribution approach infinity, it converges closer to the normal distribution. Getting the correct normalization for the area behind the t-distribution was tricky, but actually quite beautiful once the correct normalization coefficient was found.

"Tessellating" the plane - https://www.desmos.com/calculator/3qnxg63zqc

After checking the topic of Fourier Series I decided to make something creative and artistic, resulting in this non-lineal "tessellation" of the plane. There are more curves but they are disabled so the animation with the parameter a can run smoothly. Changing the parameters b and c move the curves around.