

The goal of the second project of this class is to find Hubble's constant  $H$ , which allows us to measure the rate at which the universe is expanding, with information about luminosity from a type 1A supernovae given to us. With this information, we will then be able to calculate the age of the universe with the formula  $\text{Age} = 1 / H$ . In this project, we also learned how to plot data and find a line of best fit for the data, which gave us  $H$  when we used a distance vs. time graph.

To calculate the age of the universe, we had to start by finding Hubble's constant with the data we were given. To do this, we started with importing the necessary packages and data into our code. Then, we found the distances and velocities of the points and plotted each of them on a graph, creating a positive and roughly linear relationship between the two.

Then, we found the linear line of best fit for this graph, and its slope would be  $H$  because of the Hubble Law ( $\text{velocity} = H * \text{distance}$ ). In this part of the project, we also limited our distance values to be from 0 to 700 Mpc to get a better result. Once we graphed the data points and the line of best fit, we found the slope, the Hubble constant, to be about 67.48 km/s/Mpc.

Finally, we calculate the age of the universe using the constant we found from the line of best fit. Since the age of the universe can be calculated by  $t = 1 / H$ , we just plug in the slope we found into this formula. In the end, we print the age out as 14.49 gigayears so it won't be a huge and messy number in just years. This is roughly 14.49 billion years, which is pretty close to what many other astronomers have found over the years.

Our team members are Ainsley, Maggie, and Lisa. Though we didn't work together while coding, we did share a Google slideshow with each other to create our presentation. I was in charge of explaining how we started the project, which was importing the data and creating the

initial graph. Maggie took care of explaining how we got the line of best fit for the data, and Ainsley explained how we used the numbers to solve for the age of the universe. Our written reports were also all written separately by ourselves.

I did not personally use GenAI in this project, though I am aware that Ainsley was able to calculate the chi square of the data to find if the data was close to what is expected from the line of best fit.