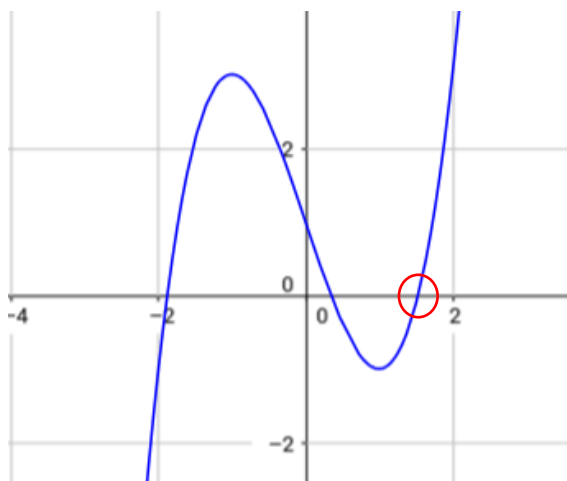


Iteration with Technology

In a Year 13 class, students are asked the following question:

“The graph of $y = x^3 - 3x + 1$ is shown below.

Use fixed-point iteration with the formula $x_{n+1} = \frac{x_n^3 + 1}{3}$ to find the root circled in red”

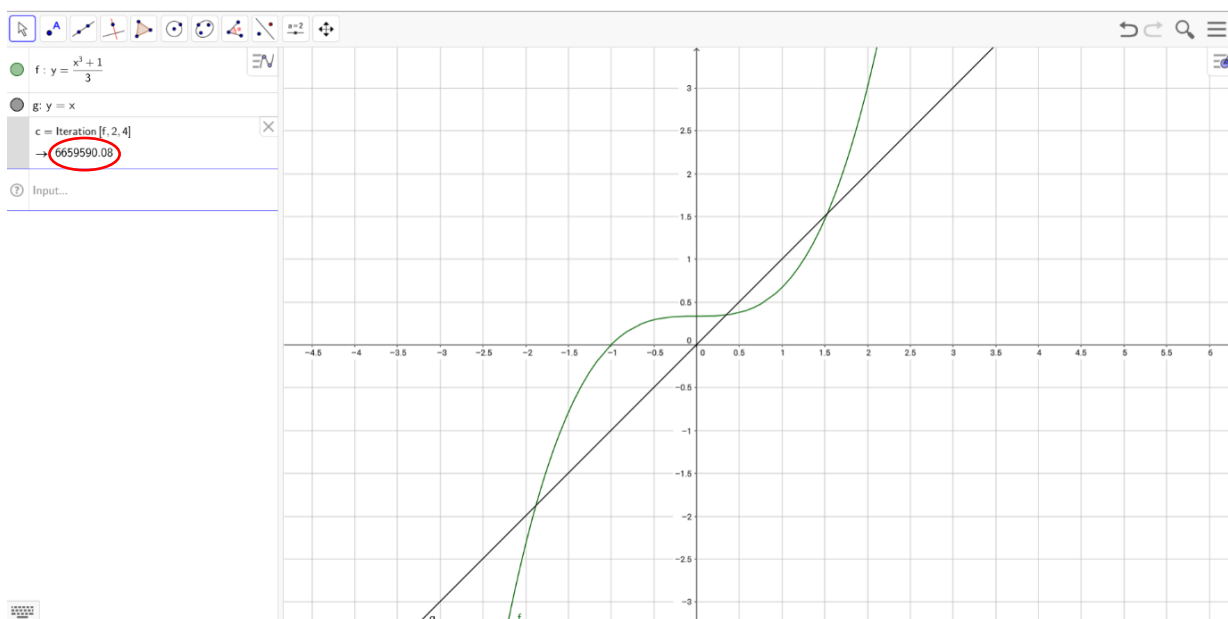


You hear the following conversation between two students:

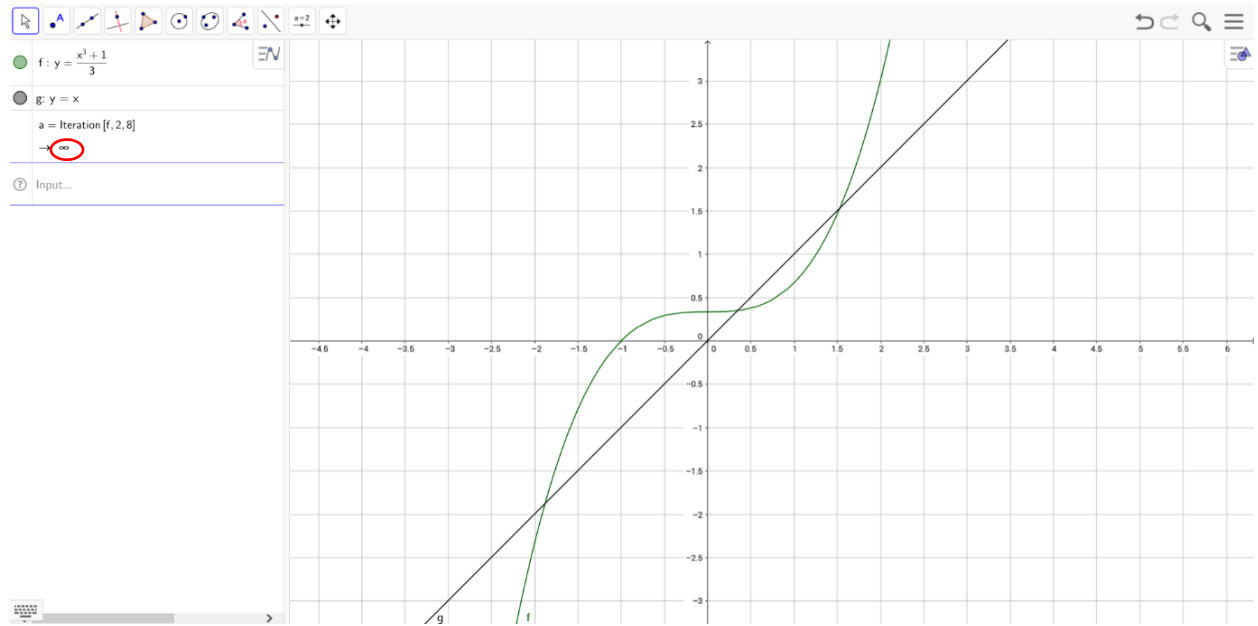
Student A: I am going to use Geogebra to solve this. It is easier!

Student B: I will use Geogebra as well! Let us enter the equations $y = x$ and $Y = \frac{x^3 + 1}{3}$ on Geogebra, and see what we get...

Student A: Ok, the root is close to 2. I am going to start with $x = 2$ and I will go for 4 iterations... Look at the value I got! I got 6,659,590.08, I think the two graphs intersect at $x = 6,659,590.08$. We cannot see that intersection point here because it is outside the screen...



Student B: I also started with $x = 2$, but I went for 8 iterations and I got infinity!



The students look confused and turn to you, the teacher.

Questions:

- How do you interpret the differences in the software outputs?
- How would you explain these differences to the two students?
- What would you say next to the two students and the whole class?

This is a Task developed by the MathTASK 2016-17 team. Let us know whether it is useful and how we can improve it at @mathtask or email Irene Biza at i.biza@uea.ac.uk. For more tasks, visit [MathTASK](https://www.math-task.org/).