NCEA Level 2 Mathematics (Homework)
6. Systems of Equations

Reading

Go and watch...

https://www.youtube.com/watch?v=aOT_bG-vWyg

What's it good for?

People use systems of equations for...

- Engineering, and the sciences: if a set of unknown quantities are all interrelated (for example, concentrations in a chemical equilibrium).
- Mathematics: solving systems of linear equations is the motivating example for *linear algebra*, which forms the algebraic basis of geometry and is itself used in engineering and the sciences for modelling systems.
- Computer graphics: finding intersection points of curves is often a problem that needs to be solved in computer graphics systems (e.g. working out where a ray of light hits a surface).

Questions

1. Find all the solutions to the system of equations

$$\begin{cases} 4x^2 + 16x + y^2 + 15 = 4xy + 8y \\ y = 2x + 3. \end{cases}$$

2. Graph the above system. If we replace the linear equation with $y = cx + 3$, for which values of c does the system have no solutions? Is it possible to pick a value of c such that the system has exactly one solution?