CAS 741: Problem Statement
Companion Cube Calculator (CCC)

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Table 1: Revision History

Date	Developer(s)	Change
September 14, 2017	Geneva Smith	First draft

The Companion Cube Calculator (CCC) is a tool for calculating the range of a mathematical equation based on its input variables. Users will be able to specify input domains for variables that are known, and the tool will determine the domains for unspecified input variables. For example, the equation $y = x + 5$ should return $y \in (-\inf, \inf), x \in (-\inf, \inf)$ whereas the constrained equation of $y = x + 5, x \geq 0$ should return $y \in [5, \inf)$. For the initial version of the CCC tool, the possible values will be limited to the domain of real numbers ($\Re$). In the special case of piece-wise equations, the ideal tool would be able to accept the full equation set as a single input. However, if this is beyond the scope of the initial version, piece-wise equations can be entered as individual equations will constrained input domains.

Computerized models of creature behaviours is a type of artificial intelligence (AI) that is frequently used by game designers to define Non-Player Characters (NPCs) in their games. While many academic approaches to AI are typically too resource intensive or exact for this application, the methodical and research-based approach to defining behaviour equations can be used to create the desired effects. This also enables the benefits related to testing and maintainability that such an approach offers. Even though this project is targeted at game designers, it can be used for any project that requires the development of mathematical equations.