## Heuristic Problem Solver Document

This program is trying to model how humans can take shortcuts when looking at problem solving. It would be extremely inefficient if people were to solve problems exhaustively, or consider all of the applications to a problem, instead we use a method that is called a heuristic. Heuristics are rules that help a person problem solve by providing a set of conditions, that if they are met, a series of consequences will occur to help aid the problem solving. The heuristic is called by a rule statement that links the number of the heuristic to the situation and its corresponding action. Going through the rules is a top down process, the goal is the goal and the scanning of the type of numbers can be considered the bottom processing. If that goal's needs are met, then the action will be carried out which solves the problem. Specifically, and example is, "if there is a two, and a zero in the numbers and a number in the numbers is two times more than the goal, then divide the number that is two times greater than the goal and add it to the product of multiplying zero to the rest of the numbers." It is important to note that the action will not be looked at until all of the criteria are met for the situation.

The goal of the crypto problem, which uses the heuristic problem solver, is to create a goal using the four basic operators, five numbers between 0 and 9 inclusive and a heuristic. Simple computations are carried out through the method of expressions which takes advantage of using the basic operators to compute sub-goals or the end goal. Furthermore, the computations follow the rules of the designated action, which provides a series of steps to go about solving the problem. For humans, a heuristic can become second nature if a heuristic is implemented enough, that is why it is considered to be a short cut; the more that the heuristic is carried out in a human, the easier the heuristic seems to become. Below is a graph that shows a listing of the applicability from 100 trials for all of the different types of heuristics.

	Applicability
Heuristic 4	0.03
Heuristic 5	0.06
Heuristic 6	0.00
Heuristic 7	0.00

Heuristic 8	0.00
-------------	------

Applicability is the measure of when you can use the Heuristic, so in this case I isolated each heuristic and ran 100 random trials and counted how many were solved. Since all of the heuristics seem to have a relatively low applicability, they may not be used much for solving the crypto assignments, however, that doesn't necessarily rule out all credibility. In the graph above, the applicability is an estimate value, if I wanted to get a more accurate value, then I would increase the number of trials that I ran. That being said the last three heuristics may not be zero, but a value that is less than 0.01. Heuristics can be very insightful because it alludes to how we process information in the human brain. One thing that this program tries to capture is the functionality of how a heuristic is carried out in humans. To emphasize this point, an exhaustive crypto problem solver is likely to yield higher results and be more accurate, however, it does not give us the information of how processing happens in the mind. Overall, any heuristic that is reasonably crafted with implementability, human executability and applicability in mind, has merit in regard to modeling the human mind. Lastly, heuristics are advantageous for implementing in other situations as well, for the same format can be used with things like math models, looking up books from a library database, as well as modeling a job interview process.