HOW IT WILL BE GRADED

The mini-project is worth 15 points plus 3 bonus points.

The basic project is worth 15 points

Graded proportionally

**Design 15 points**

CPU – 10 points

Data cache – 1 point Cecily

Instruction cache – 1 point Cecily

Registers – 2 point by Gabrielle

ALU – 2 point - Cecily

PC + IR + CU – 3 points

Execution cycle – 1 point

DISPLAY – 2 points by Gabrielle

INPUT – 2 point - Yaron

Document – 1 point (but can lose points in other places if design is hard to read) by Gabrielle

**Running program 5 points**

Branching – 1 point

Instruction bit format – 1 point

Addressing – 1 point

Program runs – 2 points

BONUS QUESTION

Listed below are three possible upgrades to your CPU. Each upgrade is worth 1 bonus point. You do not

need to answer this in any particular order. Select 1, 2 or all three features to implement. There are no part

marks for the bonus questions. You either get 0 or 1 point

Multiplication - Cecily

1. Upgrade the ALU so that it can multiply.
2. Provide an additional instruction: MULT Rx, Rx. The result is stored in Rx.

True Cache

1. Convert your instruction and data caches using actual cache addressing techniques

True Pipelining

1. Convert your pipeline to execute 2 or more instructions at the same time
2. In a real pipeline all 5 stages would be executing instructions for a total of 5 instructions executing at the same time – but I am not asking for that. If you can get 2 or more then that would be fine

Bonus points (3 in total) for mini-project

1 point for each bonus implemented correctly, 0 points otherwise (not graded proportionally, graded binary = a full yes or a zero