# Part 1

1.

* The purpose of firmware sub-circuit is to provide 8-bits of data at a 10-bit address (up to 1024 addresses).
* The oneKram circuit takes an input address, data to be written, clock, and read/write flag. When the clock is on: it will either write the input data to the input address or output the data at the input address.
* The 10-bit adder controls the address generation.

2.

* Floating inputs are detected when read\_write is floating.
* Determining reading and writing for the ram circuits implements floating input detection. When read\_write is floating, default behavior is provided – that is, writing and output to a given ram circuit is set to 0.
* This relates to the concepts in the study guide because it utilizes a buffer and pull resistor. The oneKram circuit takes advantage of a buffer and pull resistor to provide a default state for when read\_write is floating.

3.

* When sweep\_enable input is activated, the write/enable for the register (at the top of main) is activated when the clock is on, the output of that register (memory address) is fed into the 10-bit adder, incremented by one and passed to the address tunnel and re-input to the register. The address is then passed onto the firmware circuit which hands off data to the oneKram circuit. This process continues so long is halt is not active.
* Through rw\_sel. If rw\_sel is 0, data at the input address to oneKram is read and output. If rw\_sel is 1, the write data (wd on the oneKram circuit) at the input address is written.
* To select the various operations to perform on the firmware’s data at a given address with respect to the oneKram circuit.

## Part 3