Interview 1 Hints

Question 1

Hint 1:

Try adding x to R_0 and then subtracting y from R_0.

Hint 2:

We have seen how to add to R_0 in the introduction example. Subtracting from R_0 looks similar but with the R_0^- operation.

Hint 3:

If R_0 reaches 0 we can immediately end the program (even if we haven't finished subtracting all of y from R_0).

Question 2

Hint 1:

The key here is to figure out how many times we can subtract y away from x until the x reaches 0. It would be useful to introduce some extra registers.

Hint 2:

Every time we subtract y (R_2) from x (R_1), increment R_0. Once $R_1 = 0$, R_0 should contain the answer!

Hint 3:

Each time we decrement x (R_1), we can decrement y (R_2) and increment a dummy register R_3 at the same time. Then, when R_2 reaches 0, R_3 equals y. We can then swap the contents of R_2 and R_3, and continue subtracting until $R_1 = 0$.

Hint 4:

Don't forget to add a check for $R_2 = 0$ at the beginning of the program.

Question 3

Hint 1:

Can you think of a way to double a register?

Hint 2:

If we wanted to double the register R_0, we could introduce a dummy register R_2 and set R_2 to R_0. Then, add R_2 back to R_0 twice (incrementing R_0 twice for each value in R_2, rather than just once).

Hint 3:

$f(x) = 2^x$ is the same as setting $R_0 = 1$ and doubling R_0 x number of times.

Question 4

Hint 1:

This question combines ideas from both Questions 2 and 3, can you see the link?

Hint 2:

In Question 2 we counted how many times we could subtract y from x. Could we instead count how many times x can be divided by 2?