Homework 3: Answers

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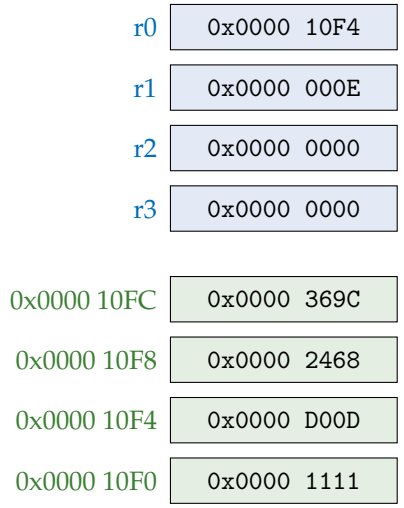
Problem: Some registers and memory cells in a microcontroller are initialized as shown. The following code is executed:

```
1 mov r2, #20
2 ldr r3, [r0, #4]
3 add r1, r3
4 ldr r3, [r0, #-4]!
5 add r2, r3
6 str r2, [r0], #8
```



What are the contents of the registers and memory after this code is executed?

Solution: Trace the code line-by-line.

1. Register `r2` now holds the value $(20)_{10} =$ `0x14`.
2. Register `r3` holds the contents of memory address `r0+#4` = `0x10F8`, so `r3` contains `0x2468`.
3. The values in registers `r1` and `r3` are added together and stored in `r1`. `0xE` + `0x2468` =`0x2476`.
4. The value in memory address `r0+#-4` = `0x10F0` (which is `0x1111`), is stored in register `r3`. The address in `r0` is updated. Therefore, `r0` holds `0x10F0`, and `r3` contains `0x1111`.
5. The values in registers `r2` and `r3` are added together and stored in `r2`. `0x14` + `0x1111` =`0x1125`.
6. The contents of `r2` are stored at the memory address held in `r0`. After this line executes, the address held in `r0` is updated by `#8`. So memory cell `0x10F0` now holds the value `0x1125`, and `r0` now contains `0x10F8`.