_____ *Your Name (first last)*

_____ *SID*

UC Berkeley
Fall 2018
CS61C Quest

_____ *← Name of person on left (or aisle)*

_____ *Name of person on right (or aisle) →*

Q1a) With **3 bits**, how do we represent **-2**? If it can't be done, select "**N/A**". (Select ONE per row)

	000	001	010	011	100	101	110	111	N/A
Unsigned	◯	◯	◯	◯	◯	◯	◯	◯	◯
Sign/Magnitude	◯	◯	◯	◯	◯	◯	◯	◯	◯
One's Complement	◯	◯	◯	◯	◯	◯	◯	◯	◯
Two's Complement	◯	◯	◯	◯	◯	◯	◯	◯	◯
Bias; use bias of $-(2^{N-1}-1)$ from lecture	◯	◯	◯	◯	◯	◯	◯	◯	◯

...scratch space below...

Q1b) Convert 26_{10} to the following bases (and remove any leading zeros)

Binary	*Hex*
0b	**0x**

Q1c) Add these *Two's Complement* nibbles:

1001 + 1011	Does it overflow a nibble? (Select ONE) ◯ Yes ◯ No

---

```
int mystery (unsigned int N) {
      unsigned int counter = 0;
      while (N > 0) {
            counter += N & 1;
            N = N >> 1;
      }
      return counter == 1;
}
```

Q2a) What does the **mystery** return? (Select ONE)

◯ The number of 1s in the binary representation of **N**
◯ 1 if **N** is odd, otherwise 0
◯ 1 if **N** is a power of 2, otherwise 0
◯ 1 if the binary representation of **N** is all 1s, otherwise 0
◯ 1 if the binary representation of **N** has any 1s, otherwise 0

Q2b) Given this setup to **mystery**:

```
unsigned int myN = GetNFromUser();
int mysteryReturn = mystery(myN);
```

...could **myN** be changed by the call to **mystery**? (Select ONE)

◯ Yes
◯ It depends on the value of **myN**
◯ No

```
// My project partner wrote this code to duplicate some elements of orig into copy
      int orig[] = {1,2,3,4,5,6,7,8}; // ints are 4 bytes wide      ...scratch space below...
      int main() {
            int *backup, *copy, **copyH;
            backup = copy = (int *) malloc (sizeof(int) * 100);
            copyH = &copy;

            for (int i = 0; i < 2; i++) {
                  *copy = orig[i];
                  copyH = *copyH + 4;
            }
      }
```

Q3a) Right *before* the **`for`** loop, where in memory do the following **point**? (Select ONE per row)

	Code	*Static*	*Stack*	*Heap*
`orig`	○	◯	○	○
`backup`	○	○	○	◯
`copyH`	○	○	◯	○

Q3b) Right *after* the **`for`** loop, what is the value of the following? If it'd be garbage, write "**G**".

`backup[0]`	**`backup[1]`**	**`copy[0]`**	**`copy[1]`**

Q4a) Which RISC-V snippet could be the compilation of the C code: **`x15 = 20 - x5`**? (Select ALL that apply)
*Assume the C variables **`x5`** and **`x15`** map directly to the registers of the same name.*

☐	☐	☐	☐
`sub x5, 20, x15`	`sub x15, 20, x5`	`addi x15, x0, 20` `sub x15, x15, x5`	`addi x15, x5, -20` `sub x15, x0, x15`

Q4b) Say we have an **`int array A[99]`** starting at address **`0x00010000`**, and register **`x5`** contains **`&A[0]`**. Assuming **`sizeof(int) == 4`**, what value is in register **`x10`** after **`lw x10, 8(x5)`** ? (Select ALL that apply)

☐	☐	☐	☐	☐	☐
`A[2]`	`A[8]`	`&A[2]`	`&A[8]`	`0x00010008`	`0x00080000`