**Q1.**

a. Shift a register value right (1 pt)
   - Shift in 0's
   - Shift by other register value
   - *No points if text is copied (plagiarism) from ARM ARM
     (unless they cite the source)*

b. 0000:00:1000:0000:0000:0000
   - 0000:0100:1101:0100
   - 0x06EA (2 pts)

   i: 0000:0110:0110:0101
   - 0x40AA (2 pts)

   ii: 0100:0000:1010:0100

   c. R11 cannot be encoded (RA is on 3 bits for encoding T1)
   - LSLS W R11, R3, #13
   - Result: 0xeaf8843 (1 pt)

**Q2.**

a. Base | 00 | 01 | 02 | 03
---|---|---|---|---
00 | 00 | 00 | 00 | 00
00 | 48 | 8A | 0C | 0E
F0 | 67 | 45 | 23 | 01
F0 | 00 | 00 | 00 | 00
---|---|---|---|---

- 2 pts endianess
- 3 pts correct location in memory

b. mov r1, #0x100
   - r1 = 0x100

   mov r2, r1
   - r2 = 0x100

   mov r2, r2
   - r2 = 0x100

   strh r2, [r1, #8]
   - r1 = [100], [102] = 0x88, [104] = 0x80

   str r2, [r1, #8]
   - r1 = [102], [104] = 0x88, [106] = 0x80

- 5 pts if correct. 2 pts if you can follow their work and they were close.

**Q3.**

Two solutions... THIS QUESTION IS HARD TO GRADE! PLEASE TAKE YOUR TIME!

-5 pts if no comments. -2 pts per mistake until 0.

- callere-save:
  - push {r4, r5, r6, lr}$
  - must save any regs used $r3$
  - caller-save regs
    - main:
      - push {lr}$
        - set initial values?
        - a = 1
        - i = 0

  - print fn call returns
  - pc = x
  - return

- return
  - pop {r4, r5, r6, lr}$
  - must restore regs $r3$

- main:
  - push {lr}$
  - move r0, #1
  - move r1, #0

  - loop:
    - loop
    - i = 0

  - print fn call returns
  - pc = x
  - return
Q4.

```c
uint32_t* x = (uint32_t*) 0x8001008;
**x = **x - 5;
```

create constant 2pts
assign as pointer 2pts
load pointer value 2pts
load pointer value 2pts
do subtraction 2pts
store result to pointer 2pts

Q5.

mean:
```
add r0, r0, r1
add r0, r0, r2
add r0, r0, r3
lsr r0, r0, #2
bx lr
```

-2 pts if missing label "mean"
-2 pts if missing bx lr
-2 pts per instruction > 5 instructions
+5 pts extra credit if < 5 instructions (must be correct)

-5 pts if doesn't calculate mean correctly but is close
-10 pts if not close
(cannot go below 0).