In-semester Test 2

- The test will be **1 hour** in duration
- No Internet, handbook or access to files
- The test will consist of **four** questions
- Do not change the names of any files.

Before the test

- You will be given a directory that contains all the required files.

During the test

- The only files you need to modify are **q1.asm**, **q2.asm**, **q3.asm, q4.asm**

After the test

- Rename the directory using your username e.g. el17abc
- Create a **.zip** of the **directory** (right-click on the directory, click 'Send to' and select 'Compressed (zipped) folder'). Do not use **.7z**.
- Your files will be collected.

Check your submission before leaving the examination venue. Once you have left the examination venue, there is no opportunity to re-submit.

Question 1

Consult the **q1.asm** file. In there, you will find the API for the code that you need to write.

Question 2

Consult the **q2.asm** file. In there, you will find the API for the code that you need to write.

Question 3

Consult the **q3.asm** file. In there, you will find the API for the code that you need to write.

Question 4

Consult the **q4.hack** file. In there, you will find some lines of binary machine code.

Dis-assemble these binary instructions back into the Hack assembly language instructions and write them in the **q4.asm** file.

Place one instruction on each line in the file. Do not include any comments or spaces between characters i.e.

M=D

Rather than

M = D

Assembly Language Reference

A-instruction format

C-instruction format

zx	nx	zy	ny	f	no	comp mnemonic		alu
c_1	c_2	c_3	c_4	c_5	c_6	a=0	a=1	
1	0	1	0	1	0	0		**0**
1	1	1	1	1	1	1		**1**
1	1	1	0	1	0	-1		**-1**
0	0	1	1	0	0	D		**x**
1	1	0	0	0	0	A	M	**y**
0	0	1	1	0	1	!D		**!x**
1	1	0	0	0	1	!A	!M	**!y**
0	0	1	1	1	1	-D		**-x**
1	1	0	0	1	1	-A	-M	**-y**
0	1	1	1	1	1	D+1		**x+1**
1	1	0	1	1	1	A+1	M+1	**y+1**
0	0	1	1	1	0	D-1		**x-1**
1	1	0	0	1	0	A-1	M-1	**y-1**
0	0	0	0	1	0	D+A	D+M	**x+y**
0	1	0	0	1	1	D-A	D-M	**x-y**
0	0	0	1	1	1	A-D	M-D	**y-x**
0	0	0	0	0	0	D&A	D&M	**x&y**
0	1	0	1	0	1	D|A	D|M	**x|y**

d_1	d_2	d_3	Mnemonic	Destination
0	0	0	null	Not stored anywhere
0	0	1	M	Memory[A]
0	1	0	D	D register
0	1	1	MD	Memory[A] and D
1	0	0	A	A register
1	0	1	AM	A register and Memory[A]
1	1	0	AD	A register and D register
1	1	1	AMD	A register, Memory[A] and D register

j_1 out < 0	j_2 out = 0	j_3 out > 0	Mnemonic	Destination
0	0	0	null	No jump
0	0	1	JGT	If out > 0 then jump
0	1	0	JEQ	If out = 0 then jump
0	1	1	JGE	If out ≥ 0 then jump
1	0	0	JLT	If out < 0 then jump
1	0	1	JNE	If out ≠ 0 then jump
1	1	0	JLE	If out ≤ 0 then jump
1	1	1	JMP	Jump