CE1921 HOMEWORK HW7	SPRING 2019	NAME: Julian Singkham

- This homework is **due on printed paper at the start of the second lecture in Week 8.**
- Your solution for each problem must show your work to receive partial credit. Failure to show your thought process will not earn points for incorrect answers.

- Three instructions have been stored in instruction memory using big-endian format. These binary numbers were created by the assembler from assembly language statements typed by the programmer. **Determine** the assembly language statements typed by the programmer by disassembling the binary numbers back into their text form.

ADDRESS	HEX BYTE
0	E5
1	96
2	C1
3	90
4	E0
5	04
6	01
7	05
8	E1
9	50
10	04
11	8C

1.) LDR R12 [R6, #400]

2.) AND R0, R4, R5 LSL#2

3.) CMP R0, R12 LSL#9

2. Implement the following Java code in ARM assembly language. You can use the MUL instruction shown on your ARM reference card for this problem. You must use the assigned registers noted in the comments. You can use other registers as needed. Your solution must be a flowchart, well-commented ARM assembly code and the Keil uVision4 simulation showing the final values after executing to the infinite loop. Write hand-written comments on the simulation that describe how you know that R5 contains the correct answer.

```
// the sum of the first n numbers can be calculated in a loop
// it can also be calculated using the equation sum = (n(n+1))/2
// while ARMv4 doesn't have a divide instruction, it can do
// quick divisions by powers-of-2 using shift right!

// store sum in register R5
// store n in register R12
int sum=0;
int n=20;

sum = (n*(n+1))/2;

while(true)
```

3. Circuit reliability is a complex function of requirements analysis, design, fabrication, and unexpected events. Fabrication faults can lead to signals that do not change value as expected. Binary signals can be stuck-at-logic-0 or stuck-at-logic-1 because of fabrication faults. Consider an ARM CPU that has control signal CPSRWR stuck-at-logic-0 in the execute stage circuit. Describe the impact on the data processing instructions in the instruction set. In other words, what instructions from your reference card would or would not work?

CMP would not work, as a result your conditional branches would not work because the CPSR would not update.

4. An early microprocessor CPU creates a 24-bit address bus. **Calculate** the size of the virtual address space in bytes. **Use** the most appropriate modern unit (KiB, MiB, GiB, etc.).

2^20+2^4=16 MiB