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 CSCE A 248  
 Midterm #1  
 9/29/22

1.) 16 bits can represent  $2^{16}$  numbers

2.) Largest 8-bit unsigned int  $= 2^8 = 256$

3.) 1010 0111 1100 0101

10 7 12 5  
 0x A 7 C 5 = 0xA7C5

4.) a.) 
$$\begin{array}{r} 1111 \\ 00111 \\ + 01011 \\ \hline 10010 \end{array}$$

b.) 
$$\begin{array}{r} 10010 \\ 01101 \\ + 11 \\ \hline 01110 = 13 \end{array}$$
  

$$10010 = -13$$

c.) Yes. If the result of adding two numbers of the same sign is the opposite sign, there is an overflow.

5.)

•)  $N=0, Z=1, C=1, V=0$ , Flags stay the same because add instruction doesn't change flags

•)  $11111111 \dots$  no borrow  $\rightarrow$  Result is non-negative  
 $- 11111111 \dots$   $N=0, C=1$  Result is zero  
 $\hline 00000000 \dots$   $Z=1, V=0$  No borrow = no carry  
 No overflow

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•)  $\dots 0001$   $C=1, N=0$  Carry is taken from right most bit  
 $Z=1, V=0$  Result is zero

Non-negative

LSRS Doesn't affect V-flag

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•)  $1111 \dots 1111$   $C=1, N=1$  Carry is taken from right most bit  
 $Z=0, V=0$  Result is not zero

Result is negative

ASRS doesn't affect V-flag but it could

•)  $0000 \dots 0000$   $C=1, N=0$  Operation doesn't update flag  
 and  $1111 \dots 1111$   $Z=1, V=0$  Result is zero  
 $0000 \dots 0000$

Result is non-negative

AndS doesn't update Z-flag



6.7 R0 = 0101...0101

R1 = 1010...1010

Ands R0, R0, R1

7.7a.7 LDR{B} R1 [0x20004004]

b.7 R1 = 0xA2DE7312

8.7 LDR{B} R0 [R1]

Subs R0, R0, #1

STR{B} R0 [R1]

9.7 LDR{SH} R1 [R0, #4]!

a.7 ↗

0x20004000

+ 0100 = 0x04

b.7 R0 = 0x20004004 ↙

R1 = 0x12549D32

