Q3) (40 points) A simple machine uses 3 hex digits to represent numbers. Let the used format be $A = A_1A_0.A_{-1}$.

R = 16, n = 2, m = 1

For unsigned system:

Maximum unsigned number = $R^n - R^{-m} = (100)_{16} - (0.1)_{16} = (FF.F)_{16} = (255.9375)_{10}$

For R's complement:

(1) Minimum –ve is $(80.0)^{16}$

– The value in decimal = $-R/2xR^{n-1} = -8x16^1 = -128.0000$

Since this number is –ve, we CAN NOT find its value using $8x16^1+0x16^0+0x16^{-1}$

However, $(80.0)_{16}$ is the –ve of M-$(80.0)_{16}$ or –($(100)_{16}$-$(80)_{16}$)= - $(80)_{16}$ = -128.0000

(2) Maximum +ve is $(7F.F)^{16}$ (i.e. the number just before the minimum –ve)

– The value in decimal = $R/2xR^{n-1} - R^{-m} = 8x16^1 - 16^{-1}= 127.9375$

Since this number is +ve

➔ we can find its value using $7x16^1+15x16^0+15x16^{-1} = 127.9375$

For R-1's complement:

(1) Minimum –ve is $(80.0)_{16}$

– The value in decimal = -R/2xRn-1 = -8x161 = -128.0000

(2) Maximum +ve is $(7F.F)_{16}$ (i.e. the number just before the minimum –ve)

– The value in decimal = $R/2xR^{n-1} - R^{-m} = 8x16^1 - 16^{-1}= 127.9375$

Q3) (40 points) A simple machine uses 3 hex digits to represent numbers. Let the used format be $A = A_1A_0.A_{-1}$.

List of all numbers of the form $A_1A_0.A_{-1}$ where A_i is a hex digit.

	Unsigned	15's Complement	16's Complement
00.0	0.0000	0.0000	0.0000
00.1	0.0625	0.0625	0.0625
00.F	0.9375	0.9375	0.9375
01.0	1.0000	1.0000	1.0000
	…	…	…
7F.E	127.8750	127.8750	127.8750
7F.F	127.9375	127.9375	127.9375
80.0	128.0000	- 127.9375	- 128.0000
80.1	128.0625	-127.8750	-127.9375
FF.E	255.8750	-0.0625	-0.1250
FF.F	255.9375	-0.0000	-0.0625