Introduction to 80x86 Assembly Language and Computer Architecture 3rd edition Detmer Solutions Manual

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Chapter 1

Exercises 1.1

1.	100	4	4
2.	1010 1101	AD	173
3.	11 0111 0101	375	885
4.	111 1101 1110	7DE	2014
5.	100 0000 0001	401	1025
6.	10 1011 0011 1111	2B3F	11071
7	1 0000 0010 0100	1024	4132
8.	1100 1001 1010	C9A	3226
9.	1000 1110 1111	8EF	2287
10.	1 0000	10	16
11.	1010 0101 0010 1110	A52E	42286
12.	111 0000 1100	70C	1804
13.	110 1011 1101 0011	6BD3	27603
14.	1110 0000 0011 1111	E03F	57407
15.	101 1100 1110	5CE	1486
16.	101 0101 0101 0101	5555	21845
17.	110 0100	64	100
18.	10 0000 1111	20F	527
19.	1 0000 0010 0000	1020	4128
20.	10 1110 1010 1011	2EAB	11947
21.	1110 0110 1000 1100	E68C	59080
22.	1 0101 1011 0011	15B3	5555
23.	1 0011 0110 1011	136B	4971
24.	10 0111 0000 1111	270F	9999
25.	11:09:36		
26.	02:57:38		
27.	03:46:32		

Exercises 1.2

1. (a) 10821 or *E
   (b) 29522 or sR
   (c) 8246 or [space]F
   (d) 4206 or [DLE]n
   (e) 18529 or Ha
   (f) 14629 or 9%

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2.

(a) 4a 61 6e 75 61 72 79 20 31 20 69 73 20 4e 65 77 20 59 65 61 72 27 73 20 44 61 79 2e 0d 0a

(b) 47 65 6f 72 67 65 20 73 61 69 64 2c 20 22 4f 75 63 68 21 22

(c) 52 32 44 32 20 77 61 73 20 43 33 50 30 27 73 20 66 72 69 65 6e 64 2e 0d 0a

(d) 59 6f 75 72 20 6e 61 6d 65 3f

(e) 45 6e 74 65 72 20 76 61 6c 75 65 3a

(f) 48 69 73 74 6F 72 79 2C 20 6C 69 6B 65 20 62 65 61 75 74 79 2C 20 64 65 70 65 6E 64 73 20 6C 61 72 67 65 6C 79 20 6F 6E 20 74 68 65 20 62 65 68 6F 6C 64 65 72 2E

(g) 32 35 2B 33 37 2D 31 38 3D 3F

3. (a) blood, sweat and tears
(b) nameCRLFaddressCRLFcityCRLF
(c) June 11, 1947CRLF
(d) $389.45
(e) ID#: 123-45-6789
(f) Greetings!
(g) 2016 is a leap year

Exercises 1.3

1.	(a) 00000F22	(b) 000F4240	(c) FFFFFF9C	(d) FFFF26FD	(e) FFFFFFFC	(f) 00007FFF
2.	(a) 034D	(b) 3A98	(c) 0064	(d) FFF6	(e) FC65	(f) 8001
3.	(a) 17	(b) 6F	(c) 9C	(d) C9	(e) 63	(f) F1

4. (a) 62,433 signed or unsigned
(b) -509 signed; 4,294,966,787 unsigned
(c) -1,732,099,715 signed; 2,562,867,581unsigned
(d) -136 signed; 4,294,967,160 unsigned
(e) 1,445,691,166 or unsigned
(f) -780,483,819 signed; 3,514,483,477 unsigned

5. (a) 163 signed or unsigned
(b) -2 signed; 65,534 unsigned
(c) 28,448 signed or unsigned
(d) –18,870 signed; 46,666 unsigned
(e) -21,755 signed; 43,781 unsigned
(f) 21,458 signed or unsigned

6. (a) -31 signed; 225 unsigned
(b) 124 signed or unsigned
(c) -1 signed; 255 unsigned

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(d) 62 signed or unsigned
(e) 89 signed or unsigned
(f) -107 signed; 149 unsigned

7. (a) -128 to +127
(b) 0 to 255

8. (a) -32,768 to +32,767
(b) 0 to 65,535

9. (a) -2,147,483,648 to 2,147,483,647
(b) 0 to 4,294,967,295

10. For any doubleword size number *x*,
100000000 - *x*
= (100000000 - 1) - *x* + 1
= (FFFFFFFF - *x*) + 1
FFFFFFFF is a pattern of 32 1s. Subtracting 0 from 1 gives 1 and subtracting 1 from 1 gives 0, that is, subtracting any bit from 1 "flips" the bit. Subtracting *x* from FFFFFFFF does this for each of the 32 bits. Therefore subtracting the hex number from 100000000 is equivalent to taking the 1s complement and then adding 1.
Other sizes work similarly.

Exercises 1.4

1. 003F + 02A4
sum: 02E3, no overflow, no carry
signed and unsigned check: 63 + 676 = 739

2. 1B48 + 39E1
sum: 5529, no overflow, no carry
signed and unsigned check: 6984 + 14817 = 21801

3. 6C34 + 5028
sum: BC5C, is overflow, no carry
signed check: 27700 + 20520 = 48220 ≠ -17316
unsigned check: 27700 + 20520 = 48220

4. 7FFE + 0002
sum: 8000, is overflow, no carry
signed check: 32766 + 2 = 32768 ≠ -32768
unsigned check: 32766 + 2 = 32768

5. FF07 + 06BD

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sum: 05C4, no overflow, is carry
signed check: -249 + 1725 = 1476
unsigned check: 65287 + 1725 = 67012 ≠ 1476

6. 2A44 + D9CC
sum: 0410, no overflow, is carry
signed check: 10820 + (-9780) = 1040
unsigned check: 10820 + 55756 = 66576 ≠ 1040

7. FFE3 + FC70
sum: FC53, no overflow, is carry
signed check: -29 + (-912) = -941
unsigned check: 65507 + 64624 = 130131 ≠ 64595

8. FE00 + FD2D
sum: FB2D, no overflow, is carry
signed check: -512 + (-723) = -1235
unsigned check: 65024 + 64813 = 129837 ≠ 64301

9. FFF1 + 8005
sum: 7FF6, is overflow, is carry
signed check: -15 + (-32763) = -32778 ≠ 32758
unsigned check: 65521 + 32773 = 98294 ≠ 32758

10. 8AD0 + EC78
sum: 7748, is overflow, is carry
signed check: -30000 + (-5000) = -35000 ≠ 30536
unsigned check: 35536 + 60536 = 96072 ≠ 30536

11. 9E58 – EBBC = 9E58 + 1444
difference: B29C, no overflow, is borrow
signed check: -25000 – (-5188) = -19812
unsigned check: 40536 - 60348 = -19812 ≠ 45724

12. EBBC – 9E58 = EBBC + 61A8
difference: 4D64, no overflow, no borrow
signed check: -5188 – (-25000) = 19812
unsigned check: 60348 – 40536 = 19812

13. EBBC – 791C = EBBC + 86E4
difference: 72A0, is overflow, no borrow
signed check: -5188 – 31004 = -36192 ≠ 29344
unsigned check: 60348 – 31004 = 29344

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14. 791C – EBBC = 791C + 1444
difference: 8D60, is overflow, is borrow
signed check: 31004 – (-5188) = 36192 ≠ -29344
unsigned check: 31004 – 60348 = -29344 ≠ 36192

15. FFFF3B3A + FFFFCD40
sum: FFFF087A, no overflow, is carry
signed check: (-50374) + (-12992) = -63366
unsigned check: 4294916922 + 4294954304 = 8589871226 ≠ 4294903930

16. FFFFFF7D + 00000082
sum: FFFFFFFF, no overflow, no carry
signed check: (-131) + 130 = -1
unsigned check: 4294967165 + 130 = 4294967295

17. FFFFFF7F + 00000082
sum: 00000001, no overflow, is carry
signed check: (-129) + 130 = 1
unsigned check: 4294967167 + 130 = 4294967297 ≠ 1

18. 78E2A51E + 7D345BA4
sum: F61700C2, is overflow, no carry
signed check: 2028119326 + 2100583332 ≠ -166264638
unsigned check: 2028119326 +2100583332 = 4128702658

19. 7E + 75
sum: F3, is overflow, no carry
signed check: 126 + 117 ≠ -13
unsigned check: 126 + 117 = 243

20. 8D + A3
sum: 30, is overflow, is carry
signed check: (-115) + (-93) = -208 ≠ 48
unsigned check: 141 + 163 = 304 ≠ 48

21. 5E + 4B
sum: A9, is overflow, no carry
signed check: 94 + 75 = 169 ≠ -87
unsigned check: 94 + 75 = 169 ≠ 7

22. FF + 01
sum: 00, no overflow, is carry

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signed check: (-1) + 1 = 0
unsigned check: 255 + 1 = 256 ≠ 0

Exercises 1.5

1. 00AF
2. FF50
3. FFD4
4. 002B
5. 00 00 02 30
6. 00 00 00 01
7. 12 34 87 65
8. 00 01 71 95
9. 432F8000
10. BFA00000
11. C13C0000
12. 42360000

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