

*Solutions Manual for Introduction to
80x86 Assembly Language and
Computer Architecture 3rd Edition by
Detmer*

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Chapter 1

Exercises 1.1

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

Exercises 1.2

- 10821 or *E
 - 29522 or sR
 - 8246 or [space]F
 - 4206 or [DLE]n
 - 18529 or Ha
 - 14629 or 9%

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) FFFFFFF9C (d) FFFF26FD (e) FFFFFFFFC (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; 2,562,867,581 unsigned
 - (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

- (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 ,
 $100000000 - x$
 $= (100000000 - 1) - x + 1$
 $= (\text{FFFFFFFF} - x) + 1$
 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: $27700 + 20520 = 48220 \neq -17316$
 unsigned check: $27700 + 20520 = 48220$
4. 7FFE + 0002
 sum: 8000, is overflow, no carry
 signed check: $32766 + 2 = 32768 \neq -32768$
 unsigned check: $32766 + 2 = 32768$
5. FF07 + 06BD

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

6. 2A44 + D9CC
sum: 0410, no overflow, is carry
signed check: $10820 + (-9780) = 1040$
unsigned check: $10820 + 55756 = 66576 \neq 1040$
7. FFE3 + FC70
sum: FC53, no overflow, is carry
signed check: $-29 + (-912) = -941$
unsigned check: $65507 + 64624 = 130131 \neq 64595$
8. FE00 + FD2D
sum: FB2D, no overflow, is carry
signed check: $-512 + (-723) = -1235$
unsigned check: $65024 + 64813 = 129837 \neq 64301$
9. FFF1 + 8005
sum: 7FF6, is overflow, is carry
signed check: $-15 + (-32763) = -32778 \neq 32758$
unsigned check: $65521 + 32773 = 98294 \neq 32758$
10. 8AD0 + EC78
sum: 7748, is overflow, is carry
signed check: $-30000 + (-5000) = -35000 \neq 30536$
unsigned check: $35536 + 60536 = 96072 \neq 30536$
11. 9E58 – EBBC = 9E58 + 1444
difference: B29C, no overflow, is borrow
signed check: $-25000 - (-5188) = -19812$
unsigned check: $40536 - 60348 = -19812 \neq 45724$
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: $-5188 - 31004 = -36192 \neq 29344$
unsigned check: $60348 - 31004 = 29344$

14. $791C - EBBC = 791C + 1444$
 difference: 8D60, is overflow, is borrow
 signed check: $31004 - (-5188) = 36192 \neq -29344$
 unsigned check: $31004 - 60348 = -29344 \neq 36192$
15. $FFFF3B3A + FFFFC40$
 sum: FFFF087A, no overflow, is carry
 signed check: $(-50374) + (-12992) = -63366$
 unsigned check: $4294916922 + 4294954304 = 8589871226 \neq 4294903930$
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: $4294967167 + 130 = 4294967297 \neq 1$
18. $78E2A51E + 7D345BA4$
 sum: F61700C2, is overflow, no carry
 signed check: $2028119326 + 2100583332 \neq -166264638$
 unsigned check: $2028119326 + 2100583332 = 4128702658$
19. $7E + 75$
 sum: F3, is overflow, no carry
 signed check: $126 + 117 \neq -13$
 unsigned check: $126 + 117 = 243$
20. $8D + A3$
 sum: 30, is overflow, is carry
 signed check: $(-115) + (-93) = -208 \neq 48$
 unsigned check: $141 + 163 = 304 \neq 48$
21. $5E + 4B$
 sum: A9, is overflow, no carry
 signed check: $94 + 75 = 169 \neq -87$
 unsigned check: $94 + 75 = 169 \neq 7$
22. $FF + 01$
 sum: 00, no overflow, is carry

signed check: $(-1) + 1 = 0$
unsigned check: $255 + 1 = 256 \neq 0$

Exercises 1.5

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|-----|-------------|-----|-------------|
| 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 |