

Solutions for Homework 1

Chapter 2

Problem 1)

Give the expanded representation for each of the following numbers. Then multiply each term and record as a decimal number.

$$(b) 302_4 = 2 \times 4^0 + 0 \times 4^1 + 3 \times 4^2 = 50_{10}$$

Problem 2)

Convert each of the following decimal numbers to a binary number:

$$(e) 256_{10} = \%100000000$$

Problem 4)

Convert each of the following unsigned binary numbers to an unsigned decimal number:

$$(c) \%111011 = 59_{10}$$

Problem 9)

Convert each of the following hex numbers to a binary number:

$$(b) \$A8897 = \%1010\ 1000\ 1000\ 1001\ 0111$$

Problem 10)

Convert each of the following binary numbers to a hex number:

$$(d) \%10101010101010101 = \$15555$$

Problem 14)

Perform the indicated operations for the binary numbers of arbitrary length.

$(b) \begin{array}{r} \%110110 \\ + \%110110 \\ \hline \%1101100 \end{array}$	$(e) \begin{array}{r} \%11001 \\ - \%01101 \\ \hline \%100 \end{array}$
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Problem 15)

Perform the indicated operations for the hex numbers of arbitrary length.

$(c) \begin{array}{r} \$555575 \\ + \$000F34 \\ \hline \$5564A9 \end{array}$	$(g) \begin{array}{r} \$76543 \\ - \$65AC1 \\ \hline \$10A82 \end{array}$
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Problem 22)

Find the 32-bit two's complement of the following hex numbers:

$$(b) \begin{array}{l} \$A07A30D0 \\ \$5F85CF30 \end{array}$$

Problem 24)

Sign extend each of the following 8-bit numbers to a 16-bit two's complement number:

(b) %10000001
%1111111110000001

(c) %01100001
%0000000001100001

Problem 26)

Perform the following operations on 16-bit two's complement hex numbers. Indicate (YES or NO) whether signed overflow occurs.

(e) \$AF76
 + \$1701
(NO) \$C677

(g) \$FF06
 + \$AF76
(NO) \$AE7C

(h) \$8701
 - \$70CD
(YES) \$1634

Problem 27)

Perform the following operations on the 16-bit unsigned hex numbers. In each case, indicate whether unsigned overflow occurs.

(c) \$AF76
 + \$10FA
(NO) \$C070

(d) \$7FFF
 + \$FFFE
(YES) \$7FFD

Problem 28)

For 6-bit signed magnitude numbers, give the representation for each of the following decimal numbers:

(c) 31
%011111

(d) -31
%111111

What is the range of these numbers?

-31 to 31

Problem 29)

For 6-bit one's complement numbers give the representation for each of the following decimal numbers:

(c) 31
%011111

(d) -31
%100001

What is the range of these numbers?

-32 to 31

Problem 34)

Let U = \$FF0C and V = \$67AB. Compute the 16-bit result for each of the following operations:

(d) NOT(U AND V) \$98F7
(e) U EOR V \$98A7
(f) (NOT U) EOR V \$675B

Problem 36)

Using a bit table, verify the equation

$$X \text{ EOR } Y = (\text{NOT } X \text{ AND } Y) \text{ OR } (X \text{ AND NOT } Y)$$

X	Y	NOT X AND Y	X AND NOT Y	X EOR Y
0	0	0	0	0
0	1	1	0	1
1	0	0	1	1
1	1	0	0	0

Problem 38)

Give the mask and the bit operation for each of the following situations:

- (a) To toggle bit 3 in an 8 bit register, EOR with %00001000
- (b) To turn off bits 5 and 6 in a register, AND with %10011111 = \$9F
- (c) To turn on bit 7 in a register, OR with %10000000 = \$80