NYU Computer Science Bridge HW1

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Question 1:

A:
1. $10011011_2 = (1*2^7)+0+0+(1*2^4)+(1*2^3)+0+(1*2^1)+(1*2^0) = 128+16+8+2+1 = 155_{10}$

2. $456_7 = (4*7^2)+(5*7^1)+(6*7^0) = 237_{10}$

3. $38A_{16} = (3*16^2)+(8*16^1)+(10*16^0) = 906_{10}$

4. $2214_5 = (2*5^3)+(2*5^2)+(1*5^1)+(4*5^0) = 309_{10}$

B:
256 128 64 32 16 8 4 2 1
1. $69_{10} = 64+4+1 = 01000101_2$

2. $485_{10} = 256+128+64+32+4+1$
$= 111100101_2$

3. $6D1A_{16} = (6 = 0+4+2+0 = 0110_2|D = 8+4+0+1 = 1101_2$
$1 = 0+0+0+1 = 0001_2|A = 8+0+2+0 = 1010_2) = 0110110100011010_2$

C:
1. $1101011_2 = 01101011 = 6+11 = 6B$

Decimal:Hexadecimal Pairs 0:0 1:1 2:2 3:3 4:4 5:5 6:6 7:7 8:8 9:9 10:A 11:B 12:C 13:D 14:E 15:F

2. $895_{10} = 895/16 = 55R15 = F$
$55/16 = 3R7$
$3/16 = 0R3 = 37F_{16}$

Question 2:

Solve the following, do all calculation in the given base. Show your work.

1. $7566_8 + 4515_8 =$
$6_8 + 5_8 = 3_8\ carry1$
$7_8 + 1_8 = 0_8\ carry1$
$6_8 + 5_8 = 3_8\ carry1$
$8_8 + 4_8 = 4_8\ carry1$
$1_8 + 0_8 = 1_8$
$= 14303_8$

2. $10110011_2 + 1101_2 =$
$1_2 + 1_2 = 0\ carry1$
$2_2 + 0_2 = 0\ carry1$
$1_2 + 1_2 = 0\ carry1$
$1_2 + 1_2 = 0\ carry1$
$2_2 + 0_2 = 0\ carry1$
$2_2 + 0_2 = 0\ carry1$
$1_2 + 0_2 = 1$
$1_2 + 0_2 = 1$
$= 11000000_2$

3. $7A66_{16} + 45C5_{16} =$
$6_{16} + 5_{16} = 11_{16} = B$
$6_{16} + 12_{16} = 2_{16} = 2\ carry1$
$11_{16} + 5_{16} = 0_{16} = 0$
$8_{16} + 4_{16} = 12_{16} = C$
$= C02B_{16}$

4. $3022_5 - 2433_5 =$
$7_5 - 3_5 = 4_5 |\ (2 - 1 = 1)$
$6_5 - 3_5 = 3_5 |\ (5 - 1 = 4)$
$4_5 - 4_5 = 0_5 |\ (3 - 1 = 2)$
$2_5 - 2_5 = 0_5$
$= 34_5$

Question 3:

256 128 64 32 16 8 4 2 1

A. Convert the following numbers to their 8-bits two's complement representation. Show your work.

1. $124_{10} = 0 + 64 + 32 + 16 + 8 + 4 + 0 + 0 = 01111100_8$

2. $-124_{10} = 10000011_8 + 00000001_8 = 10000100_8$ (flipped bits 0 - 1 and added 1)

3. $109_{10} =$

4. $-79_{10} =$

B. Convert the following numbers represented as 8-bit two's complement) to their decimal representation. Show your work.

1. $00011110_{8bit2'scomp} =$

2. $11100110_{8bit2'scomp} =$

3. $00101101_{8bit2'scomp} =$

4. $10011110_{8bit2'scomp} =$

Question 4:

Solve the following question from the Discrete Math Zybook:

1. Exercise 1.2.4, sections b, c

2. Exercise 1.3.4, sections b, d

Question 5:

Solve the following question from the Discrete Math Zybook:

1. Exercise 1.2.7, sections b, c

2. Exercise 1.3.7, sections b - e

3. Exercise 1.3.9, sections c, d

Question 6:

Solve the following question from the Discrete Math Zybook:

1. Exercise 1.3.6, sections b - d

2. Exercise 1.3.10, sections c - f

Question 7:

Solve the following question from the Discrete Math Zybook:

1. Exercise 1.4.5, sections b - d

Question 8:

Solve the following question from the Discrete Math Zybook:

1. Exercise 1.5.2, sections c, f, i

2. Exercise 1.5.3, sections c, d

Question 9:

Solve the following question from the Discrete Math Zybook:

1. Exercise 1.6.3, sections c, d

2. Exercise 1.7.4, sections b - d

Question 10:

Solve the following question from the Discrete Math Zybook:

1. Exercise 1.7.9, sections c - i

2. Exercise 1.9.2, sections b - i

Question 11:

Solve the following question from the Discrete Math Zybook:

1. Exercise 1.10.4, sections c - g

2. Exercise 1.10.7, sections c - f

3. Exercise 1.10.10, sections c - f

Question 12:

Solve the following question from the Discrete Math Zybook:

1. Exercise 1.8.2, sections b - e

2. Exercise 1.9.4, sections c - e