Khaled

# ITI1100 Assignment 1

**1.3** a) $(4310)_5 = 4\times5^3 + 3\times5^2 + 1\times5^1 + 0\times5^0$
$= 500 + 75 + 5 + 0$
$= 580$

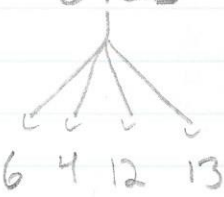
580 to base 10
$\rightarrow 5\times10^2 + 8\times10^1 + 0\times10^0 = (580)_{10}$

b) $(198)_{12} = 1\times12^2 + 9\times12^1 + 8\times12^0$
$= 144 + 108 + 8$
$= 260$
$\rightarrow \therefore (260)_{10}$

c) $(445)_8 = 4\times8^2 + 4\times8^1 + 5\times8^0$
$= 256 + 32 + 5$
$= 293$
$\rightarrow \therefore (293)_{10}$

d) $(345)_6 = 3\times6^2 + 4\times6^1 + 5\times6^0$
$= 108 + 24 + 5$
$= 137$
$\rightarrow \therefore (137)_{10}$

1.7 64CD → Binary




$= (0110\ 0100\ 1100\ 1101)_2$ in binary

$= (0\ 110\ 010\ 011\ 001\ 101)_2$

$= [(1\times2^2 + 1\times2^1) + (1\times2^1) + (1\times2^1 + 1\times2^0) + (1\times2^0) + (1\times2^2 + 1\times2^0)]$

$= (62315)_8$

1.9

a) $(10110,0101)_2 = (1\times2^4 + 0 + 1\times2^2 + 1\times2^1 + 0 + 0 + 1\times2^{-2} + 0 + 1\times2^{-4})$

$= 16 + 4 + 2 + 0,5 + 0,0625$

$= 22,625$

$= 22\ 3125$

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1.9

b) $(16.5)_{16} = 1 \times 16^1 + 6 \times 16^0 + 5 \times 16^{-1}$

$= 16 + 6 + 0.3125$

$= (22.3125)_{10}$

c) $(624)_8 = 2 \times 8^1 + 6 \times 8^0 + 2 \times 8^{-1} + 4 \times 8^{-2}$

$= 16 + 6 + 0.25 + 0.0625$

$= (22.3125)_{10}$

d) $(DABA.B)_{16} = 13 \times 16^3 + 10 \times 16^2 + 11 \times 16^1 + 10 \times 16^0 + 11 \times 16^{-1}$

$= 53248 + 2560 + 176 + 10 + 0.6875$

$= (55994.6875)_{10}$

e) $(1011.1001)_2 = 1 \times 2^3 + 0 + 1 \times 2^1 + 1 \times 2^0 + 1 \times 2^{-1} + 0 + 0 + 1 \times 2^{-4}$

$= 8 + 2 + 1 + 0.5 + 0.0625$

$= (11.5625)_{10}$

1.13

a) $(27.315)_{10}$ -> Binary

i) $2\times10^{1} + 7\times10^{0} + 3\times10^{-1} + 1\times10^{-2} + 5\times10^{-3}$

$= 20 + 7 + 0.3 + 0.01 + 0.005$
$= 27.315$

27/2 = 13 R1
13/2 = 6 R1
6/2 = 3 R0
3/2 = 1 R1
1/2 = 0 R1

So $(27)_{10} = (11011)_2$

0.315 x 2 = 0.630
0.630 x 2 = 1.260
0.260 x 2 = 0.520
0.520 x 2 = 1.040
0.040 x 2 = 0.080
0.080 x 2 = 0.160
0.160 x 2 = 0.320
0.320 x 2 = 0.640
0.640 x 2 = 1.280
0.280 x 2 = 0.560
0.560 x 2 = 1.120

So $(0.315)_{10} = (0101000101)_2$

$\therefore (27.315)_{10} = (11011.0101000101)_2$

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b) $^2/_3 = 0.66666666...$

$(0.66666666)_{10} = (0.1010101010)_2$

$(0.1010101010)_2 = 1\times2^{-1} + 0 + 1\times2^{-3} + 0 + 1\times2^{-5} + 0 + 1\times2^{-7} + 0 + 1\times2^{-9} + 0 + 1\times2^{-11}$

$= 0.66650390625$ ∴ slightly off

c) $0.66650390625 \times 16 = 10.66406$

A

$0.66406 \times 16 = 10.625$

A

$0.625 \times 16 = 10.0$

A

So $(0.66650390625)_{10} = (0.AAA)_{16}$ → decimal

↳ $(0.AAA)_{16} = 10\times16^{-1} + 10\times16^{-2} + 10\times16^{-3}$

$= 0.625 + 0.0390625 + 0.00244140625$

$= 0.66650390625$

∴ the same.

1.14

a) 10010000 -> inverse -> 01101111 (1's complement)

10010000 -> 01110000

b) 00000000 -> inverse -> 11111111

00000000 -> 00000000

c) 11011010 -> inverse -> 00100101

11011010 -> 00100110

d) 10101010 -> inverse -> 01010101

10101010 -> 01010110

e) 10100101 -> inverse -> 01011010

10100101 -> 01011011

f) 11111111 -> inverse -> 00000000

11111111 -> 00000001

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# ITI1100 Assignment 1

## 1.16

a) C 3 A F -> 12 -3 10 15

Subtract every number from F(15) then add 1

15-12 = 3 , 15-3 = 12 , 15-10 = 5 , 15-15 = 0
+ 1
= 1

∴ 3C51

b) C 3 A F -> 12 3 10 15

| | | | | | |
|---|---|---|---|---|---|
| 12/2 | = 6 | R 0 | ^ | 3/2 = 1 | R 1 | ^ |
| 6/2 | = 3 | R 0 | \| | 1/2 = 0 | R 1 | \| |
| 3/2 | = 1 | R 1 | \| | 0/2 = 0 | R 0 | \| |
| 1/2 | = 0 | R 1 | \| | 0/2 = 0 | R 0 | \| |

| | | | | | |
|---|---|---|---|---|---|
| 10/2 | = 5 | R 0 | ^ | 15/2 = 7 | R 1 | ^ |
| 5/2 | = 2 | R 1 | \| | 7/2 = 3 | R 1 | \| |
| 2/2 | = 1 | R 0 | \| | 3/2 = 1 | R 1 | \| |
| 1/2 | = 0 | R 1 | \| | 1/2 = 0 | R 1 | \| |

∴ C3AF = $(1100\ 0011\ 1010\ 1111)_2$

c) $(1100\ 0011\ 1010\ 1111)_2$ -> 0011 1100 0101 0001

d) $(0011\ 1100\ 0101\ 0001)_2$

$0011 = 1\times2^0 + 1\times2^1 = 3$ , $1100 = 1\times2^3 + 1\times2^2 = 12$

$0101 = 1\times2^2 + 1\times2^0 = 5$ , $0001 = 1\times2^0 = 1$

So 3 12 5 1 -> 3C51

comparing to a), they are equal to eachother

1.17

a) 6473 - 5297 -> 9999 - 5297 + 1 = 4703

6473 + 4703 = 11176 -> discard 1

∴ 1176

b) 125 - 1800 -> 9999 - 1800 + 1 = 8200

125 + 8200 = 8325 (no end carry)

so 125 - 1800 = -1675

∴ -1675

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# ITI100 Assignment 1

## 1.17

c) 1076 - 3217 -> 9999 - 3217 + 1 = 6786

1076 + 6786 = 7862 (no end carry)

So 1076 - 3217 = -2141

∴ -2141

d) 1631 - 745 -> 9999 - 0745 + 1 = 9255

1631 + 9255 = 10886 (discard 1)

∴ 0886

## 1.19

a) 10011 - 10010 , 10010 -> 01110

```
  1 1 1
  10011
+ 01110
  -----
 100001
```

end carry -> discard 1

∴ 00001 or 1

->

b) 100010 - 100110 , 100110 → 011010

```
  100010
+ 011010        no end carry
--------
  111100
```

↳ 111100 → 000100

∴ -000100 or -100

c) 1001 - 110101 , 110101 → 001011

```
  001001
+ 001011        no end carry
--------
  010100
```

↳ 010100 → 101100

∴ -101100

d) 101000 - 10101 , 010101 → 101011

```
  101000
+ 101011        end carry, discard 1
--------
 1010011
```

↳ ∴ 010011