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**CSIS 1800: Introduction to Computer Science and Information Systems**

**Chapter number: 2**

**Assignment number: 2**

1. Convert the following numbers from the base shown to base 10.
   1. 0010110101110111 (base 2)

|  |
| --- |
| 0 \* 2^15 = 0  + 0 \* 2^14 = 0  + 1 \* 2^13 = 8192  + 0 \* 2^12 = 0  + 1 \* 2^11 = 2040  + 1 \* 2^10 = 1040  + 0 \* 2^9 = 0  + 1 \* 2^8 = 256  + 0 \* 2^7 = 0  + 1 \* 2^6 = 64  + 1 \* 2^5 = 32  + 1 \* 2^4 = 16  + 0 \* 2^3 = 0  + 1 \* 2^4 = 4  + 1 \* 2^1 = 2  + 1 \* 2^0 = 1  = 11639 |

* 1. 2356 (base 8)

|  |
| --- |
| 2 \* 8^3 = 1024  + 3 \* 8^2 = 192  + 5 \* 8^1 = 40  + 6 \* 8^0 = 6  = 1262 |

* 1. 2456 (base 16)

|  |
| --- |
| 2 \* 16^3 = 8192  + 4 \* 16^2 = 1024  + 5 \* 16^1 = 80  + 6 \* 16^0 = 6  = 9302 |

1. Explain how base 2 (BIN), base 8 (OCT), and base 16 (HEX) are related. Demonstrate this relationship using an example.

Base 2 (BIN), base 8 (OCT), and base (HEX) are related because they are all powers of 2’s. For example, base 8 digits can be read off in binary and three base 2 digits can be read off in octal:

Binary number: 001011010

Binary to Octal

001 🡪 1

011 🡪 3

010 🡪 2

= 132

1. Convert the following binary numbers to hexadecimal.
   1. 11101111

Binary to Hex

1110 🡪 E

1111 🡪 F

= EF

* 1. 01110101

Binary to Hex

0111 🡪 7

0101 🡪 5

= 75

* 1. 10101010

Binary to Hex

1010 🡪 A

1010 🡪 A

= AA

1. Convert the following hexadecimal numbers to octal.
   1. 13DB

Hex 🡪 1 3 D B

Binary 🡪 0001 0011 1101 1011

Regroup… 001 001 111 011 011

Octal 🡪 1 1 7 3 3

= 11733

* 1. C7F5

Hex 🡪 C 7 F 5

Binary 🡪 1100 0111 1111 0101

Regroup… 001 100 011 111 110 101

Octal 🡪 1 4 3 7 6 5

= 143765

* 1. BC93

Hex 🡪 B C 9 3

Binary 🡪 1011 1100 1001 0011

Regroup… 001 011 110 010 010 011

Octal 🡪 1 3 6 2 2 3

= 136223

1. Convert the following octal numbers to hexadecimal.
   1. 1761

Octal 🡪 1 7 6 1

Binary 🡪 001 111 110 001

Regroup… 0011 1111 0001

Hex 🡪 3 F 1

= 3F1

* 1. 4632

Octal 🡪 4 6 3 2

Binary 🡪 100 110 011 010

Regroup… 1001 1001 1010

Hex 🡪 9 9 A

= 99A

* 1. 1671

Octal 🡪 1 7 6 1

Binary 🡪 001 110 111 001

Regroup… 0011 1011 1001

Hex 🡪 3 B 9

= 3B9

1. Perform the following hexadecimal additions (Use column format and indicate carry/borrow flags)
   1. 5BA7 + 727C

1 1 🡨carry

5 B A 7

+7 2 7 C

C E 2 3

* 1. 8EB1 – 4F6A

7 30 A 17 🡨borrow

8 E B 1

- 4 F 6 A

3 F 4 7

* 1. 21FF + 1B24

1 1 🡨carry

2 1 F F

+1 B 2 4

3 D 2 3

1. Study my tutorials, and then give the scientific expressions (use mantissa, and exponent ) in DEC (power of 10) and BIN (power of 2) for the following values
   1. 1Kilo

1 × 10^(3) 🡨DEC (power of 10)

1.111101000 × 2^(9) 🡨BIN (power of 2)

* 1. 1Mega

1 × 10^(6) 🡨DEC (power of 10)

1.1110100001001000000 × 2^(19) 🡨BIN (power of 2)

* 1. 1Giga

1 × 10^(9) 🡨DEC (power of 10)

1.11011100110101100101000000000 × 2^(29) 🡨BIN (power of 2)

1. Study my tutorials, and then give the scientific expressions in DEC (power of 10) and BIN (power of 2) for the following values
   1. milli

1 × 10^(-3) 🡨DEC (power of 10)

1.000001 × 2^(-10) 🡨BIN (power of 2)

* 1. Micro

1 × 10^(-6) 🡨DEC (power of 10)

1.00001 × 2^(-20) 🡨BIN (power of 2)

* 1. Nano

1 × 10^(-9) 🡨DEC (power of 10)

1.00010 × 2^(-30) 🡨BIN (power of 2)

* 1. Pico

1 × 10^(-12) 🡨DEC (power of 10)

1.00011 × 2^(-40) 🡨BIN (power of 2)

1. Study my tutorials, and then give the scientific expressions in DEC (power of 10) and BIN (power of 2) for the following values
   1. 512Kbyte

512 × 10^(3) 🡨DEC (power of 10)

1.111101000000000000× 2^(18) 🡨BIN (power of 2)

* 1. 64 Mbyte

512 × 10^(3) 🡨DEC (power of 10)

1.1110100001001000000000000 × 2^(25) 🡨BIN (power of 2)

1. Calculate the exact DEC number for BIN equivalent of:
   1. 512 Kbyte

|  |
| --- |
| 1 \* 2^18 = 262144  + 1 \* 2^17 = 131072  + 1 \* 2^16 = 65536  + 1 \* 2^15 = 32768  + 1 \* 2^14 = 16384  + 0 \* 2^13 = 0  + 1 \* 2^12 = 04096  + 0 \* 2^11 = 0  …  + 1 \* 2^0 = 0  = 512000 |

* 1. 64 Mbyte

|  |
| --- |
| 1 \* 2^25 = 33554432  + 1 \* 2^24 = 16777216  + 1 \* 2^23 = 8388608  + 1 \* 2^22 = 4194304  + 0 \* 2^21 = 0  + 1 \* 2^20 = 1048576  + 0 \* 2^19 = 0  + 0 \* 2^18 = 0  + 0 \* 2^17 = 0  + 0 \* 2^16 = 0 🡪see next page  + 1 \* 2^15 = 32768  + 0 \* 2^14 = 0  + 0 \* 2^13 = 0  + 1 \* 2^12 = 4096  …  + 0 \* 2^0 = 0  = 64000000 |