Tutorial 1
Number Bases

Exercise 1

1. Work out the following positive powers of two.

- $2^0 =$
- $2^1 =$
- $2^2 =$
- $2^3 =$
- $2^4 =$
- $2^5 =$
- $2^6 =$
- $2^7 =$
- $2^8 =$
- $2^9 =$
- $2^{10} =$
- $2^{11} =$
- $2^{12} =$
- $2^{13} =$
- $2^{14} =$
- $2^{15} =$
- $2^{16} =$
- $2^{17} =$
- $2^{18} =$
- $2^{19} =$
- $2^{20} =$

From now on, you have to know the first positive powers of two by heart (at least from 2^0 to 2^{16}).

2. Work out the following negative powers of two.

- $2^{-1} =$
- $2^{-2} =$
- $2^{-3} =$
- $2^{-4} =$
- $2^{-5} =$
- $2^{-6} =$
- $2^{-7} =$
- $2^{-8} =$
- $2^{-9} =$
- $2^{-10} =$

From now on, you have to know the first negative powers of two by heart (at least from 2^{-1} to 2^{-5}).

Exercise 2

1. Convert the following numbers from the source form into the destination form. Do not write down the result in a fraction or a power form (e.g. write down 0.25 and not ¼ or 2^{-2}).

Number to Convert	Source Form	Destination Form	Result
10101101	Binary	Decimal	
ABC	Hexadecimal	Decimal	
251	Decimal	Binary	
622	Decimal	Hexadecimal	
A4D	Hexadecimal	Binary	
1101101101101110	Binary	Hexadecimal	
1001.101	Binary	Decimal	
3C.28	Hexadecimal	Decimal	
35.23	Decimal	Binary (5 digits after the point)	
18.15	Decimal	Hexadecimal (3 digits after the point)	
A7.F3	Hexadecimal	Binary	
1100101.11011	Binary	Hexadecimal	

2. Same question (homework).

Number to Convert	Source Form	Destination Form	Result
1001100101101100	Binary	Decimal	
12BE	Hexadecimal	Decimal	
631	Decimal	Binary	
3,129	Decimal	Hexadecimal	
BD9F	Hexadecimal	Binary	
110111011010011001	Binary	Hexadecimal	
110101.1011001	Binary	Decimal	
A4C.148	Hexadecimal	Decimal	
48.12	Decimal	Binary (7 digits after the point)	
92.47	Decimal	Hexadecimal (4 digits after the point)	
8.DECA	Hexadecimal	Binary	
11001010110.01101011	Binary	Hexadecimal	

Exercise 3

1. Perform the following binary additions:
   - 10101110 + 11001100
   - 1110011 + 1110011 + 1001011 + 101111

2. Perform the following binary subtractions:
   - 11100001 – 10011011
   - 11101100110 – 110110110

3. Perform the following binary multiplications:
   - 1101011 × 10101
   - 10001100 × 100101

4. Perform the following binary divisions:
   - 1100110 / 101 (6 digits after the point)
   - 1011000100 / 1101 (4 digits after the point)

5. Perform the following hexadecimal additions:
   - A6B4 + DECA
   - 451 + 98D + E09