- Number Systems
  - Decimal Number Systems (0,1,2,3,4,5,6,7,8,9) r= 10
  - Binary Number Systems (0,1) r=2
  - Octal Number systems (0,1,2,3,4,5,6,7) r=8
  - Hexadecimal Number Systems (0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F) r =16

  - No, but these are very common
  - Base-5 number system (0,1,2,3,4) r= 5, from 0 till r-1
  - $(345)_8$

Number System Conversions

- Binary to Decimal---discussed
- Octal to Decimal---
- Hexadecimal to Decimal
- How to get decimal number from other number systems?

- Decimal to Binary $(123.45)_{10} = (?)_2$
- Decimal to Octal
- Decimal to Hexadecimal

- Octal to Binary or vice-versa
- Hexadecimal to Binary or vice-versa

- Octal to Hexadecimal ---octal to binary and then binary to hexadecimal

Number System Conversions

- Decimal to Binary $(123.45)_{10} = (?)_2$
  - Solve the problems into two parts:
  - 2nd step: solve integer part 123===divide by 2 ====get result from here (pppp)
  - 3rd step: solve the fraction part 0.45 === multiply by 2====get result from here (.qqqqq)
  - Write your answer (pppp.qqqqq)2

- Decimal to Octal
  - First step: solve the problems into two parts:
  - 2nd step: solve integer part 123===divide by 8 ====get result from here (pppp)
  - 3rd step: solve the fraction part 0.45 === multiply by 8====get result from here (.qqqqq)
  - Write your answer (pppp.qqqqq)8

- Decimal to Hexadecimal
  - First step: solve the problems into two parts:
  - 2nd step: solve integer part 123===divide by 16 ====get result from here (pppp)
  - 3rd step: solve the fraction part 0.45 === multiply by 16====get result from here (.qqqqq)
  - Write your answer (pppp.qqqqq)16

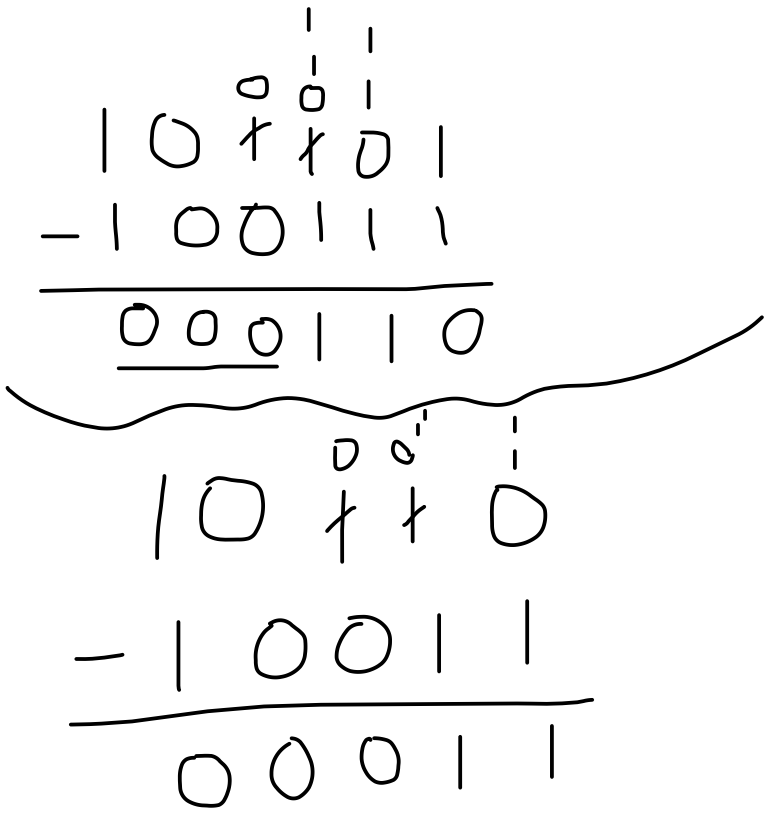
Arithmetic Operations

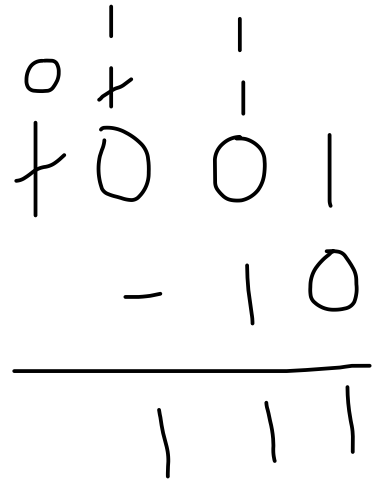
- Addition (Binary)
- Subtraction (three different ways) two more need to be done
- Multiplication
- Division

- We finished lecture-1.1 and book section 1.2-1.4
- Complements (10's and 9's , 2's and 1's) Lecture 1.2 book section 1.5 and 1.6

Subtraction

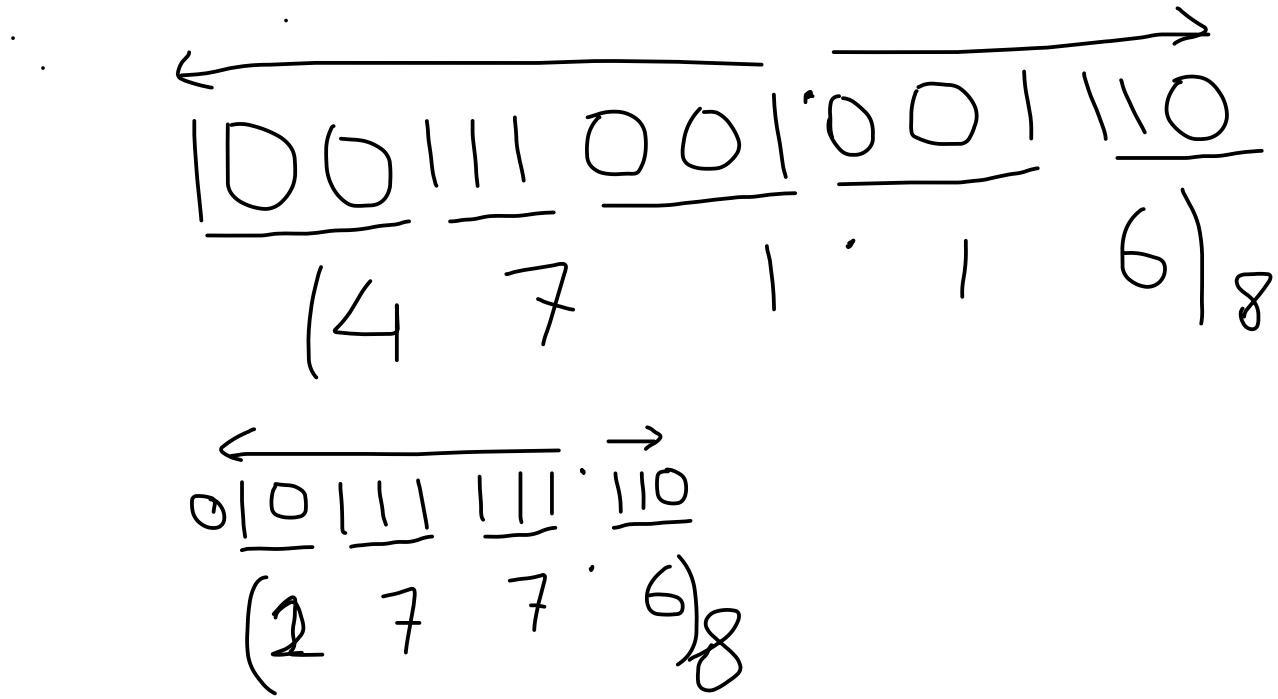
-
- 1 0 1 1 0 1
- (-) 1 0 0 1 1 1
- 0





- Borrow

Binary to Octal



Binary to hexadecimal