Representation of sets, functions

- Computer representation of sets
- Computer representation of functions
- Graphs of functions

Special functions

- All domains: identity $\mathfrak{I}(x)$

  Note: $f \circ f^{-1} = f^{-1} \circ f = \mathfrak{I}$

- Integers: floor, ceiling, DecimalToBinary, BinaryToDecimal
- Reals: exponential, log

Special functions

- DecimalToBinary, BinaryToDecimal
- E.g. $7 = 111_2$, $1001_2 = 9$
- BinaryToDecimal – n = 1001_2 :
- $n = 1*2^3 + 0*2^2 + 0*2^1 + 1*2^0 = 9$

- DecimalToBinary – n = 7:
- b_1 = n rem 2 = 1, n = n div 2 = 3
- b_2 = n rem 2 = 1, n = n div 2 = 1
- b_3 = n rem 2 = 1, n = n div 2 = 0.
- STOP

Special functions – contd.

- Changing bases: In general need to go through the decimal representation
- E.g: $101_7 = ?_9$
- $101_7 = 1*7^2 + 0*7^1 + 1*7^0 = 50$
- Decimal to Base 9:
- $d_1 = n \text{ rem } 9 = 5, n = n \text{ div } 9 = 5$
- $b_2 = n \text{ rem } 9 = 5, n = n \text{ div } 9 = 0.$
- STOP
- So $101_7 = 55_9$

Special functions – tricks

- Changing bases that are powers of 2:
- Can often use shortcuts.
- Binary to Octal:
- $10\,111\,101 = 275_8$

- Binary to Hexadecimal:
- $1011\,1101 = BD_{16}$

- Hexadecimal to Octal: Go through binary, not decimal.

Logarithms

- Appendix 2.
- Inverse function of exponential

- Th 2: log of sum, powers (pg A-8)

- Th 3: Change of bases (pg A-8)