NUMBER SYSTEMS SUPPLEMENTARY NOTES

- Complement number systems

COMPLEMENTS (1/3)

- "Find the complement of a number" or "complement a number" is the short way of saying… "find the negated value in that complement system".
- For example, the two questions below are equivalent.
  - [4-bit] Find/get the 1's complement of 0110
    (or, 1's complement this value: 0110)
    Answer: 1001.
  - [4-bit] If x is 0110_{1s}, what is -x in 1's complement form?
    Answer: 1001_{1s}
- So, "find the 1's complement of 0110" is not asking for "how is 0110 represented in 1's complement". See next two slides for more examples.

COMPLEMENTS (2/3)

- Examples:
  - [8-bit] Find the 1's complement of 00000101 (or, What is the 1's complement of 00000101?)
    Answer: 11111010
  - [8-bit] Find the 1's complement of 11001000 (or, What is the 1's complement of 11001000?)
    Answer: 00110111
  - [8-bit] Find 101_2 in 1's complement (or, How is 101_2 represented in 1's complement?)
    Answer: 00000101_{1s}
  - [8-bit] Find -101_2 in 1's complement (or, How is -101_2 represented in 1's complement?)
    Answer: 11111010_{1s}
  - [6-bit] Find the 2's complement of 111000 (or, What is the 2's complement of 111000?)
    Answer: 001000
  - [6-bit] Find the 2's complement of 000101 (or, What is the 2's complement of 0000000101?)
    Answer: 111011

COMPLEMENTS (3/3)

- More examples:
  - [8-bit] What is 7_{10} in 2's complement form?
    Answer: 00000111
  - [8-bit] What is -7_{10} in 2's complement form?
    Answer: 11111001
  - [10-bit] What is 14_{10} in 1's complement form?
    Answer: $(0000001110)_{1s}$
  - [10-bit] What is -14_{10} in 2's complement form?
    Answer: $(1111110010)_{2s}$

END