CS-341 Lecture 9

March 2, 2001

Hamming Codes

- Codewords have multiple parity bits.
- $P_0\ P_1\ P_2\ D_3\ P_4\ D_5\ D_6\ D_7\ P_8\ D_9\ D_{10}\ D_{11}\ D_{12}\ D_{13}\ D_{14}\ D_{15}$ ...
  - Parity bits are in positions that are numbered with powers of two.
  - Data bits fill in other places.
  - Each parity bit produces even parity for all codeword bits that have the parity bit's power of two in their subscripts.
  - P_0 is even parity across the entire codeword.
    - Omitted in the textbook, but needed for double error detection.
- Checking: Pattern of parity errors tells position in which error occurred. Correct it by inverting the value.
  - But if overall parity is correct when there are other errors, a double error was detected and cannot be corrected.