CS 10 5-8-14

Lab 4 due Wednesday, extend to Thursday.
9:00-12:45 Wednesday

Recall: ASCII codes use
1 byte (8 bits) to
encode a single char.

0-127: standard ASCII
128-255: extended ASCII

Unicode: 110,000 characters + symbols

UTF-8: an encoding that falls under Unicode standard, uses var. length seq. of 8-bit code units, called octets.
Ex. input data

\[ \frac{75.65}{14} - \frac{35}{16} = \frac{75.30}{16} = 30.00010 \]

Audio data = analog information

Sound Pressure Wave

Sampling: results in a seq. of integers.
Parameters:

- Sampling rate: # samples/second
- Bit depth: # of bits/sample

MP3: Samples 44,100 samples/second at 16 bits/sample

Ex.

How many bits are required to store a 3 minute audio signal using sample rate = 44,100 \( \frac{1}{s} \) and bit depth of 16 bits/sample? (assume no compression.)
Answer

\[ \frac{3 \text{ m/min} \times 60 \frac{\text{sec}}{\text{min}} \times 44100 \frac{\text{sec}}{\text{min}}}{4800 \frac{\text{sec}}{\text{min}}} \times 16 \frac{\text{bits}}{\text{byte}} = 127,008,000 \text{ bits} \]

= 15,876,000 \text{ bytes}
Bistable Device:

(1) Two stable energy states (0, 1)
(2) States are separated by a large energy barrier.
(3) Can determine which state device is in (0, 1) without changing state.
(4) Can change state by inserting a certain amount of energy.
Transistor

Switch states in 1-10 nanoseconds ($10^{-9}$ sec.)

When voltage is high at B, the switch is closed, current flows. Otherwise, switch is open, no current flows.
**Logic Gates**

**And**

\[
\begin{array}{ccc}
0 & 0 & 0 \\
0 & 1 & 0 \\
1 & 0 & 1 \\
1 & 1 & 1 \\
\end{array}
\]

**Or**

\[
\begin{array}{ccc}
0 & 0 & 0 \\
0 & 1 & 1 \\
1 & 0 & 1 \\
1 & 1 & 1 \\
\end{array}
\]

**Not**

\[
\begin{array}{cc}
0 & 1 \\
1 & 0 \\
\end{array}
\]
and gate:

![And gate diagram](image)