Homework 1 Solutions for Computer Logic and Circuit Design: PHYS306/COSC330

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1 1.1

- Digital quantities don't suffer from noise or bandwidth issues in the same way as analog. Digital quantities can be saved and replicated more easily. Digital quantities have certain downsides as well.
- Any scalar quantity that is physically observable: windspeed, current, voltage.

2 1.2

- Define the sequence of bits represented by each of the following levels: replace HIGH with 1's and LOW with 0's.
- List the sequence of levels...opposite of previous problem.
- Rise time: $\approx 1\mu$s, same as fall time. Pulse width: $\approx 2\mu$s. Amplitude: 10V.
- Period of pulse sequence: 4 μs
- Frequency: inverse of period, so 0.25 kHz or 250 Hz.
- Periodic
- The duty cycle is the pulse width divided by the period, so $(2/4)\mu$s or 50 percent.
- 10101110
- Serial transfer time: 8 μs. Parallel: 1 μs.

3 1.3

- AND gate
- AND gate
- OR gate
- Other answers were possible, but we've encountered AND, OR, and NOT in this chapter

4 1.4

- Adder, multiplier, multiplexer, comparator
- $N = \Delta t \Delta f = 100\ ms\ \times\ 10\ kHz\ = 1000$. **Remember that the inverse of a millisecond is a kHz.**
- 01010000

5 1.5

- LSI
- DIP - dual inline package (the IC audio amp in the radios is a SIP, single inline package). SMT are surface mount parts, which are much smaller and don't require through-holes. They require special machines to assemble.
- Use the special notches to find pin 1. From pin 1, the numbers proceed counter-clockwise.