

Buzz Words from Topic Name

- *Digital* - all information is represented by discrete values
- *Synchronous* - operations are coordinated and controlled by a clock signal

Types of Circuits

- *Combinational*
 - Output is completely dependent on inputs (pure function)
 - Stateless
- *Sequential*
 - Has state elements
 - Output can depend on the stream of last inputs

Signals

- Output of one is the input of another
- For this class, wires are effectively instantaneous
- Signals are continuously propagated

Delay Problem

- Use the figure on the back. What is the critical path, and what is its delay in ns?
 $4ns + 5ns + 6ns + 3ns + 2ns = 20ns$
- What is the maximum frequency the critical path can operate at?
 $1/20ns = 50MHz$
- Could it run at 20MHz? What about 62.5MHz? To make it run at 62.5MHz, what must its period be?
Yes it can run at 20MHz since that is slower. It can't run at 62.5MHz since that would need a period of $1/62.5MHz = 16ns$.
- You want to make it run at 62.5MHz. Choose what you would do and why would it work?
 - A) Do nothing
 - B) Make box #1 have delay 8ns
 - C) Make box #2 have zero delay
 - D) Make box #3 have delay 3ns and box #4 have delay 2ns

We need to shave off 4ns to get our critical path delay down to 16ns. Options B, C, all remove 4ns of delay, but b & C don't affect the critical path.

