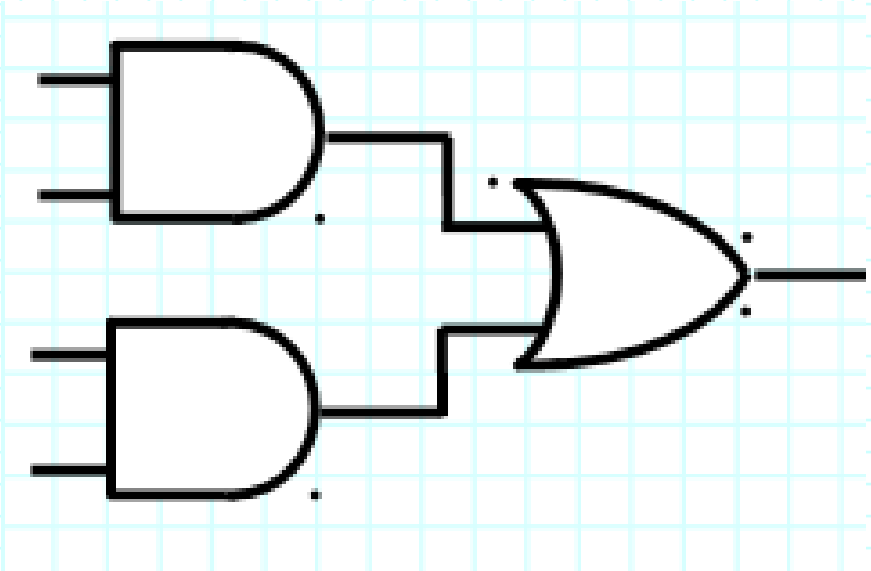
Introduction to Digital Logic

- Universal Gates
- Muxes
- Decoders

Doug Shook

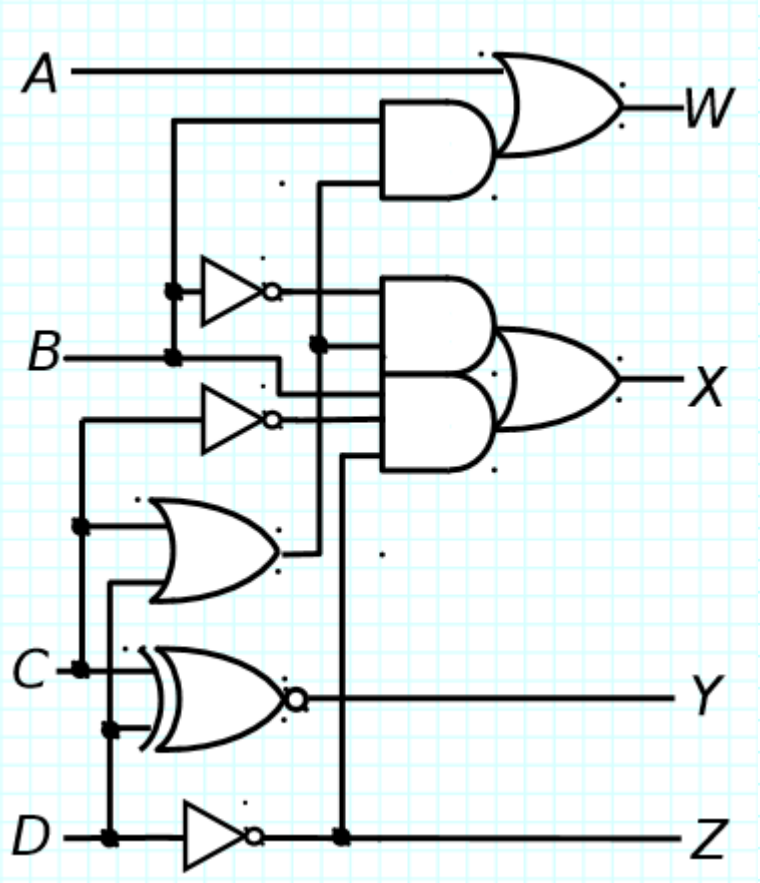
Review Questions

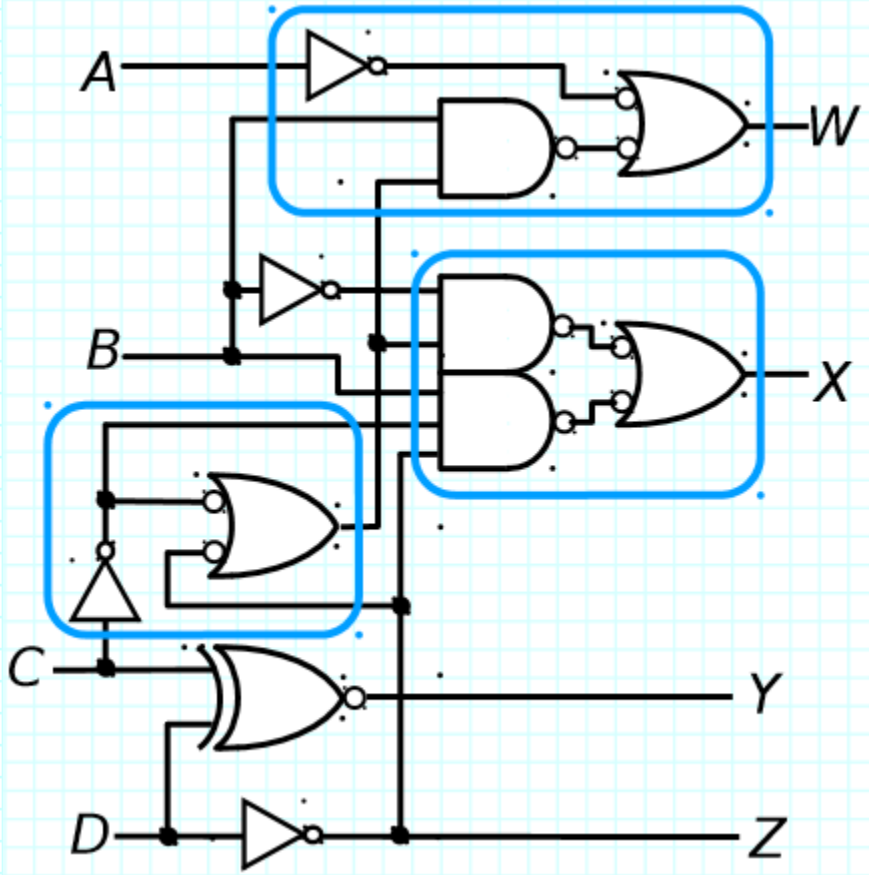
- Prove that NOR is a universal gate by constructing AND, OR, and NOT gates using only NORs.
- Why are NAND gates considered better than combinations of ANDs, ORs, and NOTs?
- Recreate the following circuit using only NOR gates:



Review Questions

- What is the difference in transistor count between these two circuits?





Review Questions

- Construct a truth table for a two input mux.
- Determine a boolean expression for this two input mux.
- Prove the boolean expression using a K-map.
- Draw a circuit diagram for your two input mux using AND, OR, and NOT.
- Redraw your circuit diagram using only NAND and NOT.
- Use your 2 input mux to construct a 4 input mux.

Review Questions

- Construct a truth table for a one to two decoder.
- Determine a boolean expression for this one to two decoder.
- Draw a circuit diagram for your one to two decoder using AND, OR, and NOT.
- Redraw your circuit diagram using only NAND and NOT.
- Use your one to two decoder to construct a two to four decoder.

Review Questions

- Draw a circuit for the following VHDL segment. Do not simplify it first!

```
x <= b and c when a='0' else
     not c when a>b else
     a or d;

y <= (a & d) when a='1' else
     (b & (not c)) when (b='0' and c='1') else
     '1' & c;
```

Review Questions

- Write VHDL for the following circuit:

