

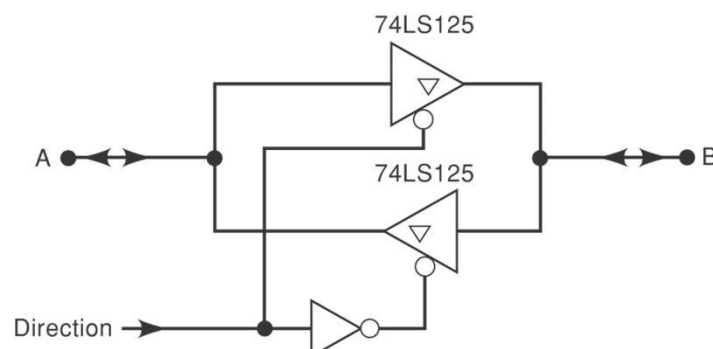
## L11 practice problems

1. Two different logic circuits have the characteristics shown below.
  - (a) Which circuit has better DC noise margin?
  - (b) Which circuit has better DC fan-out?
  - (c) Which circuit can operate at a higher frequency?
  - (d) Are the two circuits able to drive each other?

	Circuit A	Circuit B
$V_{CC}$ (V)	5	5
$V_{IH(min)}$ (V)	1.6	1.8
$V_{IL(max)}$ (V)	0.9	0.7
$V_{OH(min)}$ (V)	2.2	2.5
$V_{OL(max)}$ (V)	0.4	0.3
$I_{IH(max)}$ (mA)	1.0	1.5
$I_{IL(max)}$ (mA)	1.0	1.5
$I_{OH(max)}$ (mA)	20	27
$I_{OL(max)}$ (mA)	25	30
$t_{PLH}$ (ns)	10	18
$t_{PHL}$ (ns)	8	14
PD (mW)	16	10

(Adapted from Tocci, Widmer and Moss, ed. 10)

2. The figure below shows how two tristate buffers can be used to construct a bidirectional transceiver that allows digital data to be transmitted from A to B, or from B to A. Describe the circuit operation.  
(Tocci, Widmer & Moss, ed. 10)



3. Describe the operation and hence obtain the Boolean expression for this CMOS circuit.  
(Wakerly Ex. 3.59)

