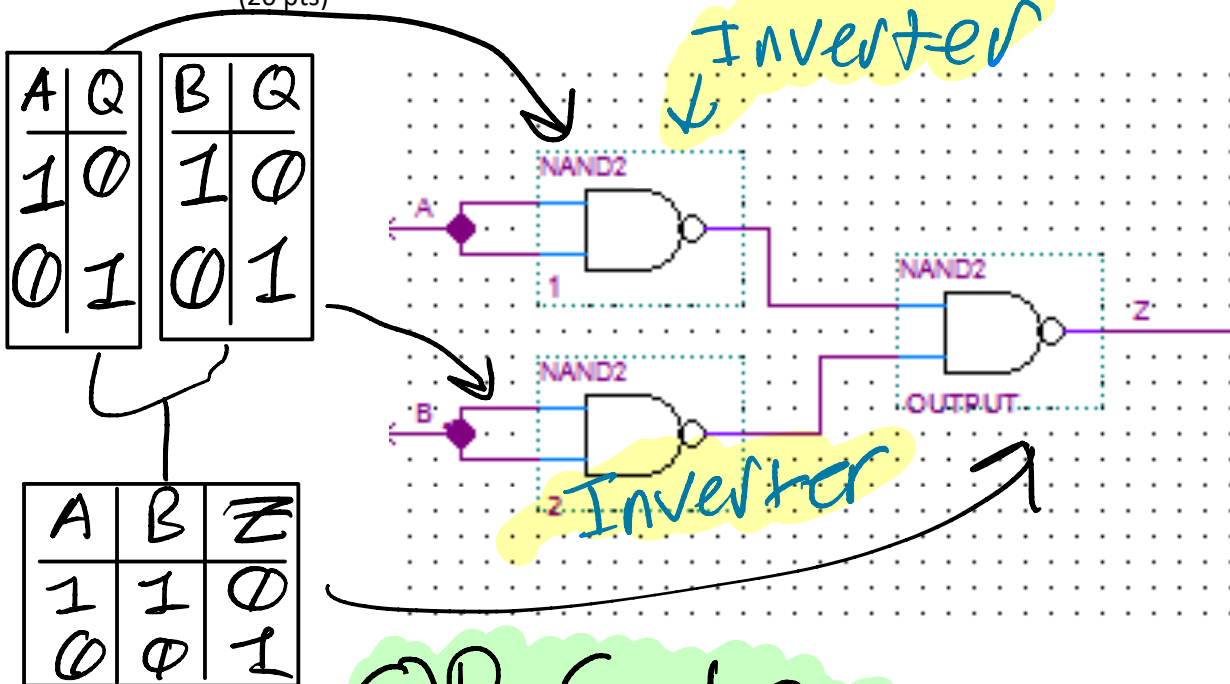


CSc 137 - Exam #2

Name: Matthew Mendonça

1. Indicate which single logic gate is represented by circuit below? Inputs are A, B and output is Z. (20 pts)



Answer: OR Gate

Three NAND Gates = OR Gate

2. Are the following statements True or false? (40 pts)

(a) The output of a Moore state machine changes synchronously. (Circle the correct answer below)

True or False?

TRUE

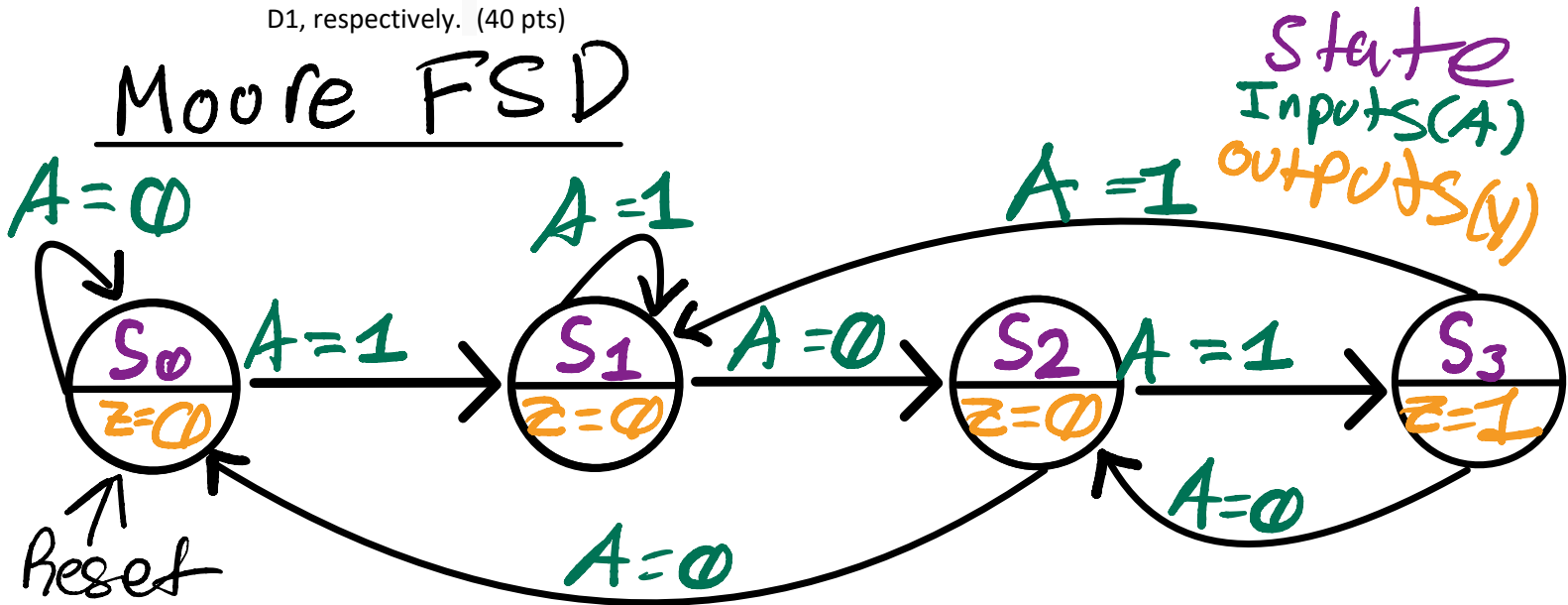
(b) A NAND gate is the same as a NOR gate with its inputs complemented. (Circle the correct answer below)

True or False?

False

3. Design a Moore sequence recognizer that detects the overlapping sequence "101". Use binary encoded state labels and design and draw the circuit schematic. (i.e. FSD, Next state generator Table (shows transition from current state to next state), Output Generator Table and schematic circuit. Please use output label as Y and input label as A. Your inputs to D flip-flops will be D0 and D1, respectively. (40 pts)

Moore FSD



NSG

FlipFlop

$S_0 \rightarrow 00$
 $S_1 \rightarrow 01$
 $S_2 \rightarrow 10$
 $S_3 \rightarrow 11$

		Current State		Input A	Next State	
		D ₀	D ₁	A	D ₀ ⁺	D ₁ ⁺
1	S ₀	0	0	0	0	0
2	S ₀	0	0	1	0	1
3	S ₁	0	1	0	1	0
4	S ₁	0	1	1	0	1
5	S ₂	1	0	0	0	0
6	S ₂	1	0	1	1	1
7	S ₃	1	1	0	1	0
8	S ₃	1	1	1	0	1

OG

	Current State			Output
	D_0	D_1		Y
1	0	0	S_0	0
2	0	1	S_1	0
3	1	0	S_2	0
4	1	1	S_3	1

Inputs(A)
Outputs(Y)

Flip Flop
 $D_0 D_1$

$$\begin{aligned}
 D_1^+ &= \bar{A} D_0 D_1 + A \bar{D}_0 D_1 + \bar{A} D_0 D_2 \\
 &= \bar{A} D_0 D_1 + \bar{A} D_0 D_1 + A \bar{D}_0 D_1 \\
 &= \bar{A} (D_0 \bar{D}_1 + D_0 D_1) + A D_0 D_1
 \end{aligned}$$

complemented Law

$$D_0 (\bar{D}_1 + D_1) = 1$$

$$D_0 \cdot 1$$

$$\therefore D_0$$

$$= \bar{A} (D_0) + A D_0 D_1$$

$$D_0 = X$$

$$Y = D_0 D_1$$

