

ITI1100B&C

Professor: Qi Hao

Assignment # 5

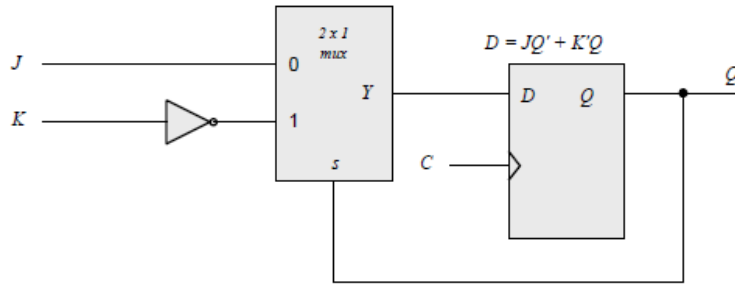
Submission Deadline March 19, 2017 midnight (11h59 PM), BlackBoard Learn

From the textbook Chapter five pages from pages 246 to 249, solve the following problems:

5.2, 5.6, 5.9, 5.10, 5.12

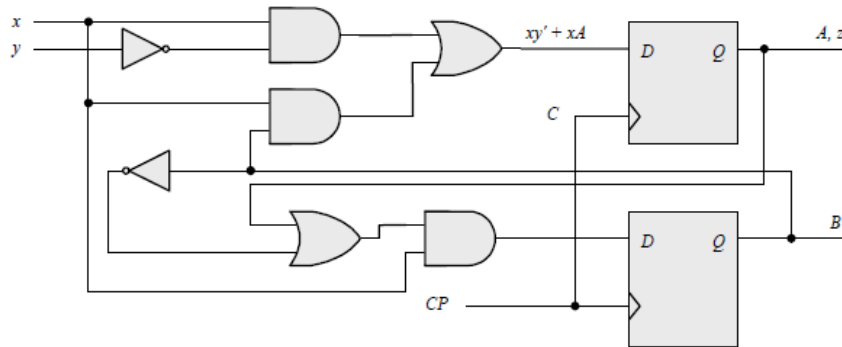
5.2

Total
5 points



5.6

Total
9 points



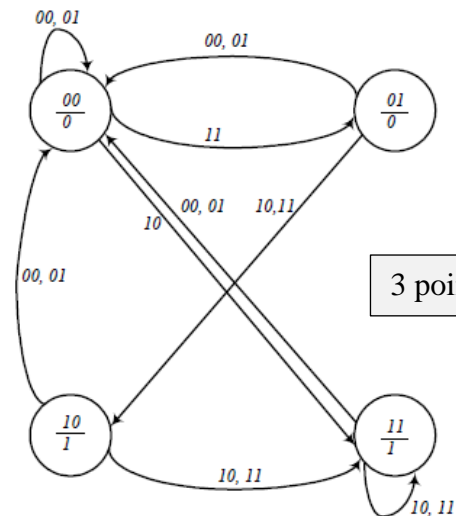
3 points

(b) $A(t+1) = xy' + xB$
 $B(t+1) = xA + xB'$
 $z = A$

3 points

| Present state | | Inputs | | Next state | | Output |
|---------------|---|--------|---|------------|---|--------|
| A | B | x | y | A | B | z |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 |

(c)



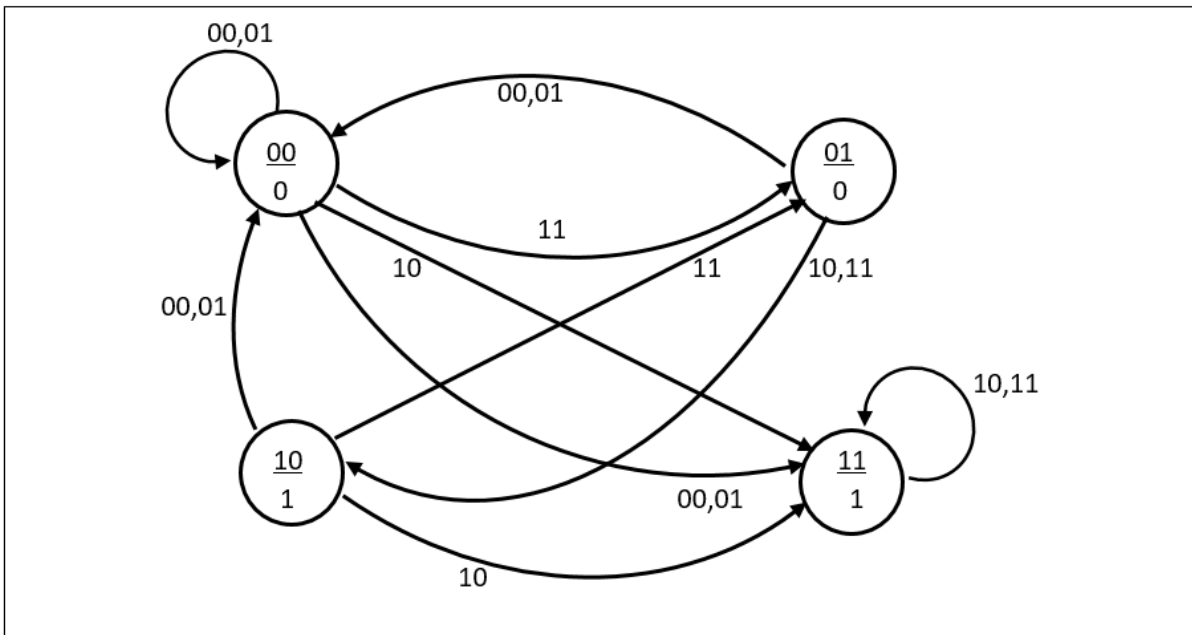
3 points

Note: 5.6 (b) and (c) are wrong. Correct answers are:

b)

| <u>Present state</u> | | Inputs | | <u>Next state</u> | | Output |
|----------------------|---|--------|---|-------------------|---|--------|
| A | B | X | Y | A | B | Z |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 | 1 | 1 | 1 |
| 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 |

c)



5.9

Total
6 points

$$J_A = x \quad K_A = B$$

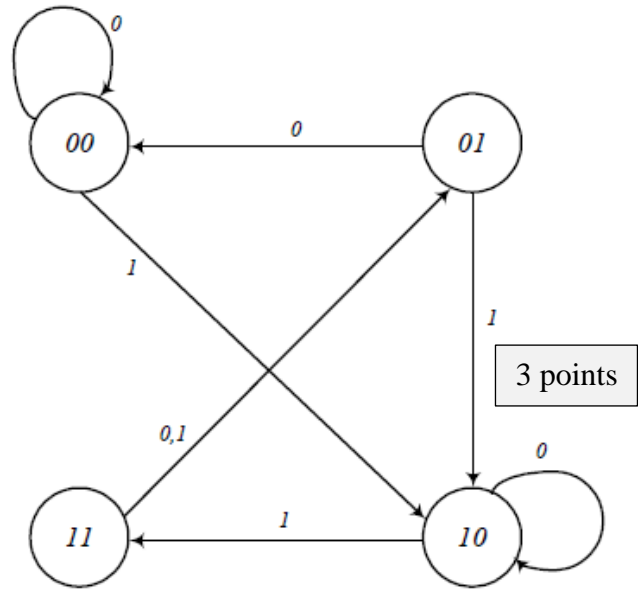
$$J_B = x \quad K_B = A'$$

3 points

$$A(t+1) = J_A A' + K_A' A = xA' + B'A$$

$$B(t+1) = J_B B' + K_B' B = xB' + AB$$

| x | A | B | $xA' + B'A$ | $xB' + AB$ |
|-----|-----|-----|-------------|------------|
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 1 |



3 points

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5.9 Note: error correction

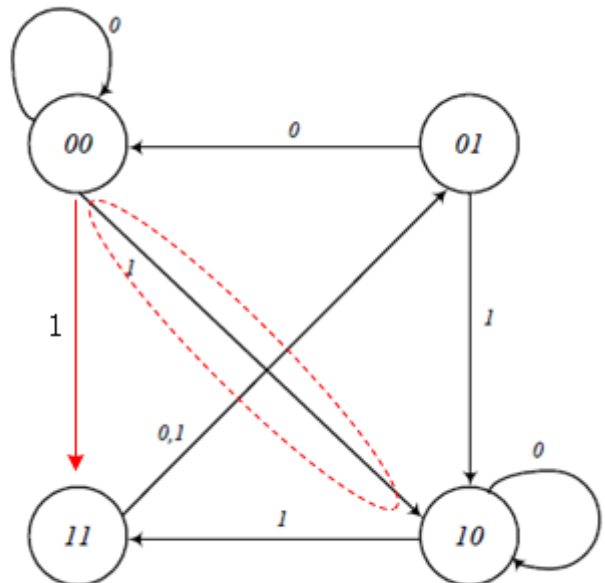
$$J_A = x \quad K_A = B$$

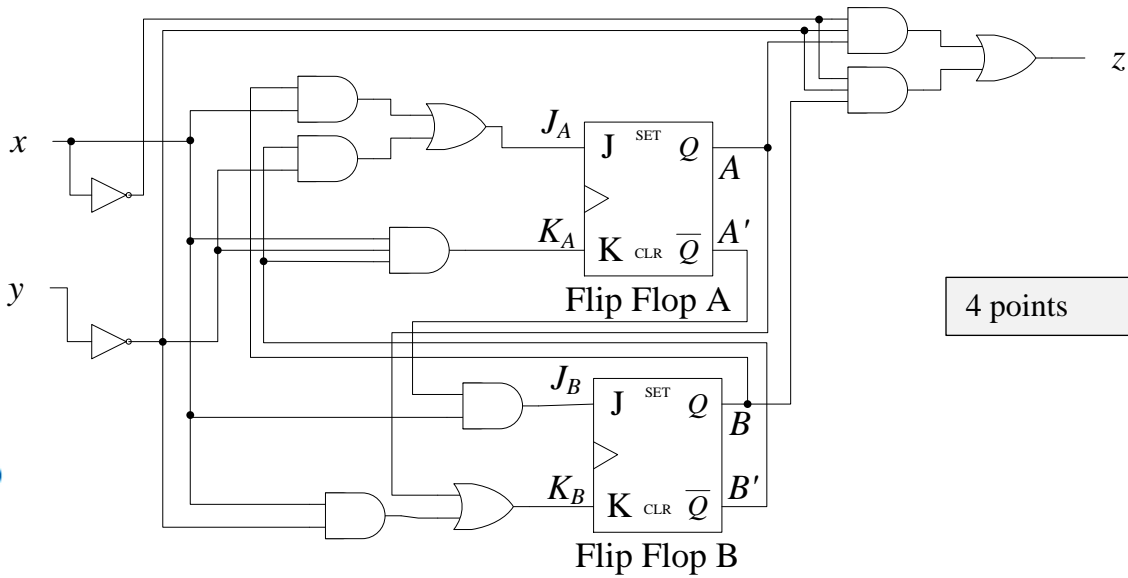
$$J_B = x \quad K_B = A'$$

$$A(t+1) = J_A A' + K_A' A = xA' + B'A$$

$$B(t+1) = J_B B' + K_B' B = xB' + AB$$

| x | A | B | $xA' + B'A$ | $xB' + AB$ |
|-----|-----|-----|-------------|------------|
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 1 |





4 points

5.10 (a)

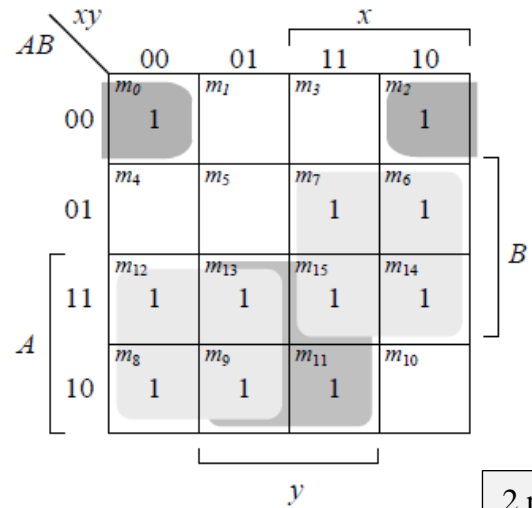
Total 12 points

(b)

| Present state | | Inputs | | Next state | | Output | FF Inputs | | | |
|---------------|---|--------|---|------------|---|--------|-----------|-------|-------|-------|
| A | B | x | y | A | B | z | J_A | K_A | J_B | K_B |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |

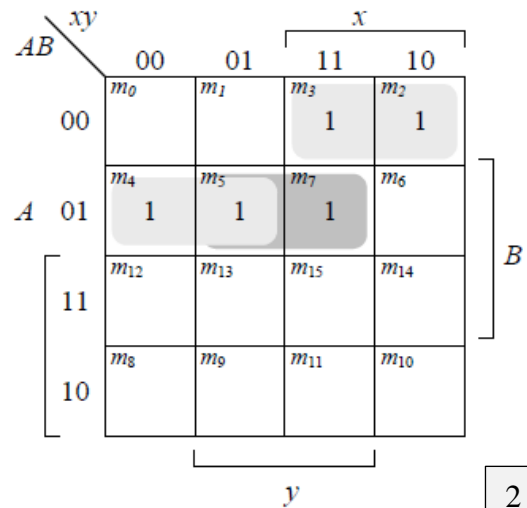
4 points
(2 points for next state/output)
(2 points for FF inputs)

(c)



2 points

$$A(t+1) = Ax' + Bx + Ay + A'B'y'$$



2 points

$$B(t+1) = A'B'x + A'B'(x' + y)$$

Note: 5.10 (c) Error Correction: $B(t + 1) = A'xy + A'B'x + A'Bx'$, or $B(t + 1) = A'B'x + A'B(x' + y)$

5.12

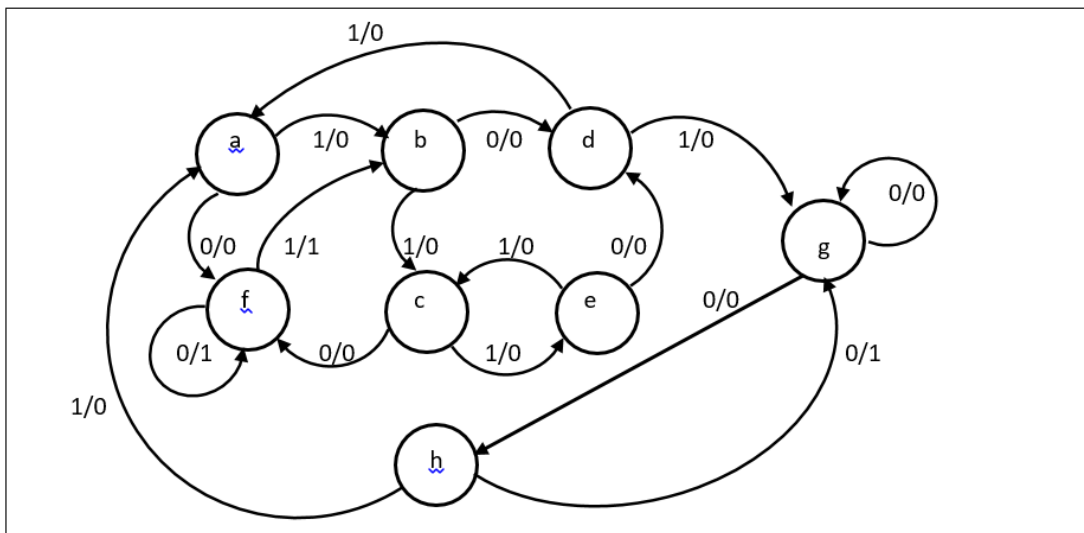
| Present state | Next state | | Output | |
|---------------|------------|----------|--------|---|
| | 0 | 1 | 0 | 1 |
| <i>a</i> | <i>f</i> | <i>b</i> | 0 | 0 |
| <i>b</i> | <i>d</i> | <i>a</i> | 0 | 0 |
| <i>d</i> | <i>g</i> | <i>a</i> | 1 | 0 |
| <i>f</i> | <i>f</i> | <i>b</i> | 1 | 1 |
| <i>g</i> | <i>g</i> | <i>d</i> | 0 | 1 |

Total
8 points

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Note: 5.12 correct answers are:

a)



Total
2.5 points

b)

| Present state | Next state | | Output | |
|---------------|------------|-------|--------|-------|
| | X = 0 | X = 1 | X = 0 | X = 1 |
| a | f | b | 0 | 0 |
| *b | d | c | 0 | 0 |
| c | f | e | 0 | 0 |
| d | g | a | 1 | 0 |
| *e | d | c | 0 | 0 |
| f | f | b | 1 | 1 |
| g | g | h | 0 | 1 |
| h | g | a | 1 | 0 |



| Present state | Next state | | Output | |
|---------------|------------|-------|--------|-------|
| | X = 0 | X = 1 | X = 0 | X = 1 |
| *a | f | b | 0 | 0 |
| b | d | c | 0 | 0 |
| c | f | b | 0 | 0 |
| d | g | a | 1 | 0 |
| f | f | b | 1 | 1 |
| g | g | h | 0 | 1 |
| h | g | a | 1 | 0 |

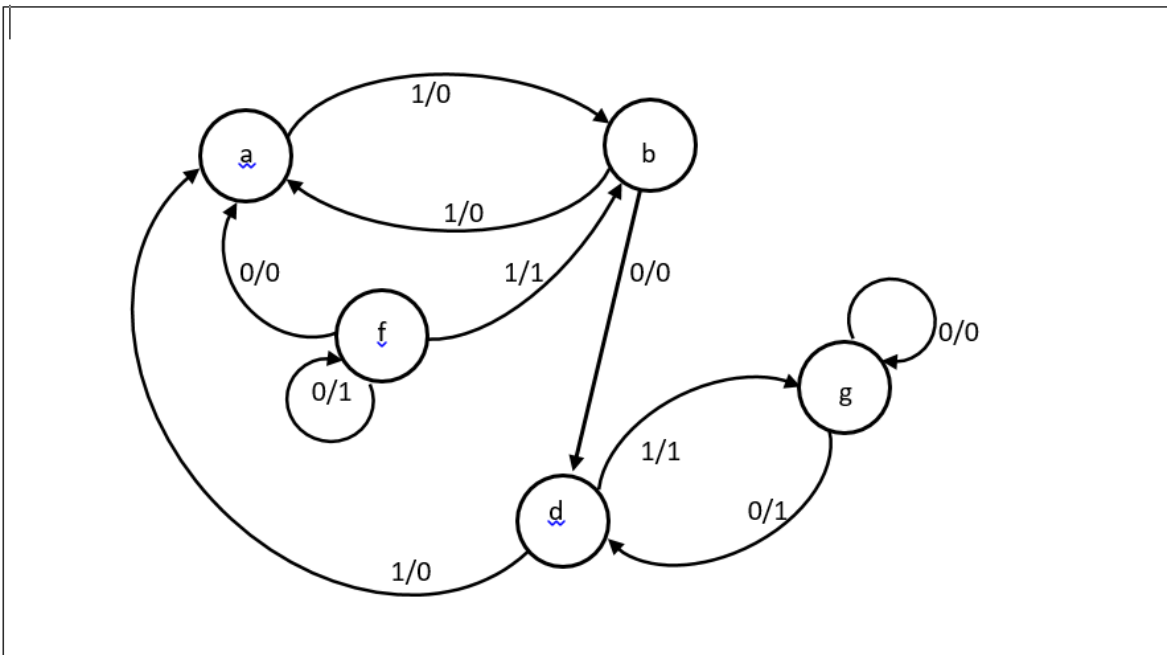
Total
3 points

| Present state | Next state | | Output | |
|---------------|------------|-------|--------|-------|
| | X = 0 | X = 1 | X = 0 | X = 1 |
| a | f | b | 0 | 0 |
| b | d | a | 0 | 0 |
| *d | g | a | 1 | 0 |
| f | f | b | 1 | 1 |
| g | g | h | 0 | 1 |
| *h | g | a | 1 | 0 |



| Present state | Next state | | Output | |
|---------------|------------|-------|--------|-------|
| | X = 0 | X = 1 | X = 0 | X = 1 |
| a | f | b | 0 | 0 |
| b | d | a | 0 | 0 |
| d | g | a | 1 | 0 |
| f | f | b | 1 | 1 |
| g | g | d | 0 | 1 |

c)



Total
2.5 points