Homework 3

1. A. i.

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | C | Output |
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 |
|  | | | |

ii.

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | C | Output |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 0 |
|  | | | |

B.

(!A & !B & !C) | (!A & !B & C) | (A & B & !C) | (A & B & C)

((!A & !B) & !C) | ((!A & !B) & C) | ((A & B) & !C) | ((A & B) & C)

Which can be ((!A & !B) & (!C | C)) | ((A&B) & (!C | C))

Then **(!A & !B) | (A & B)**

Thus it is:

**A XNOR B**

1. A. start = 000, saw 1 = 001, saw 13 = 010, saw 132 = 011, saw 1325 = 100

|  |  |  |  |
| --- | --- | --- | --- |
| Current State | Input | Next State | Output |
| Start | 1 | Saw 1 | 0 (closed) |
| Start | Not 1 | Start | 0 |
| Saw 1 | 3 | Saw 13 | 0 |
| Saw 1 | Not 3 | Start | 0 |
| Saw 13 | 2 | Saw 132 | 0 |
| Saw 13 | Not 2 | Start | 0 |
| Saw 132 | 5 | Saw 1325 | 1 |
| Saw 132 | Not 5 | Start | 0 |
| Saw 1325 | 1 | Saw 1 | 0 |
| Saw 1325 | Not 1 | Start | 0 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Q2 | Q1 | | Q0 | In2 | In1 | | In0 | D2 | D1 | D0 | | Output |
| 0 | 0 | | 0 | 0 | 0 | | 1 | 0 | 0 | 1 | | 0 |
| 0 | 0 | | 0 | Not 1 | | | | 0 | 0 | 0 | | 0 |
| 0 | 0 | | 1 | 0 | 1 | | 1 | 0 | 1 | 0 | | 0 |
| 0 | 0 | | 1 | Not 3 | | | | 0 | 0 | 0 | | 0 |
| 0 | 1 | | 0 | 0 | 1 | | 0 | 0 | 1 | 1 | | 0 |
| 0 | 1 | | 0 | Not 2 | | | | 0 | 0 | 0 | | 0 |
| 0 | 1 | | 1 | 1 | 0 | | 1 | 1 | 0 | 0 | | 1 |
| 0 | 1 | | 1 | Not 5 | | | | 0 | 0 | 0 | | 0 |
| 1 | 1 | | 1 | 0 | 0 | | 1 | 0 | 0 | 1 | | 0 |
| 1 | 1 | | 1 | Not 1 | | | | 0 | 0 | 0 | | 0 |
|  | |  | |  | |  | |  |  | |  | |

Output = (!Q2 & Q1 & Q0 & In2 & !In1 & In0)

D2 = (!Q2 & Q1 & Q0 & In2 &!In1 & In0)

D1 = (!Q2 & !Q1 & Q0 & !In2 & In1 & In0) + (!Q2 & Q1 & !Q0 & !In2 & In1 & !In0)

D0 = (!Q2 & !Q1 & !Q0 & !In2 & !In1 & In0) + (!Q2 & Q1 &!Q0 & !In2 & In1 & !In0) + (Q2 & Q1 & Q0 & !In2 & !In1 & In0)

Not 3/0

1/0

5/1

Not 1/0

Not 5/0

Start

Saw 1325

Not 2/0

2/0

Saw 132

3/0

Saw 13

1/0

Saw 1