CS 370 Homework 1

1-9.

|  |  |  |
| --- | --- | --- |
| Decimal | Binary | Hexadecimal |
| 369.3125 | 101110001.0101 | 171.5 |
| 189.625 | 10111101.101 | BD.A |
| 62407.625 | 1111001111000111.101 | F3C7.A |

1-12a. 1010 x 1100 = 111000

1-12b. 0110 x 1001 = 0110110

1-12c. 1111001 x 011101 = 11000111110101

2-3a. ABC’ + BC’D’ + BC + C’D = B + C’D

ABC’ + ABC + BC + BC’D’ + BC’D +C’D

AB(C’ + C) + BC’(D’ + D) + BC + C’D

AB + BC’ + BC + C’D

B + AB + C’D

B + C’D

2-6a. A’C’ + A’BC + B’C = A’ + B’C

2-6b. (A + B + C)’ + A’B’C’ = A’B’C’

2-6c. ABC’ + AC = A(B + C)

2-6d. A’B’D + A’C’D + BD = (A’ + B)D

2-6e. (A + B)(A + C)(AB’C) = ABB’C

2-11a.

2-11b.

2-11c.

2-11d. E = X’Y’Z + X’YZ’ + XY’Z’ + XYZ’

F = X’Y’Z’ + X’YZ’ + XY’Z’ + XYZ

2-11e. E = (X + Y)Z’ + X’Y’Z

F = (X’ + Y’)Z’ + XYZ

2-17a.

2-17b.

2-20a.

Prime implicants: A’BC’, A’CD, ABC, ACD’, BD

Essential Prime implicants: A’BC’, A’CD, ABC, AC’D

Optimized function: A’BC’ + A’CD + ABC + AC’D

2-20b.

Prime implicants: X’Y, X’Z’, WY’Z’, WXY’, XY’Z, W’XZ, W’YZ

Essential Prime implicants: X’Y, X’Z’, WXY’, W’XZ

Optimized function: X’Y + X’Z’ + WXY’ + W’XZ

2-20c.

Prime implicants: Y’Z’, WY’, W’Z’, WXY, XYZ, W’XY

Essential Prime implicants: WY’, W’Z’, XYZ

Optimized function: WY’, W’Z’, XYZ

3-9.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| A | B | C | D | S2 | S1 | S0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 0 |

S0 = B’C’D + B’CD’ + AB’ + AC’D’ + A’BCD

S1 = A’B + AB’ + A’CD + BC’D’

S2 = ABC + ABD

3-10.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A | B | C | D | W | X | Y | Z |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

Note: from 1010 to 1111, WXYZ will all be null do to it already filling up already

W = A + B + C

X = B’C’ + BC

Y = C’

Z = D

3-11.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PS | LS | R | RR | PL | LL | RL |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 0 |

PL = PS

LL = (PS)’(LS)(RS)’ + (PS)’(LS)(RR)

RL = (PS)’(LS)’(RS) + (PS)’(RS)(RR)’