# 5 Quine-McCluskey Method

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1. Use the Quine-McCluskey method to find a minimum SOP expression for $F(A,B,C) = \Sigma m(1,3,4,5)$

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| group | | minterms | binary |
|---|---|---|---|
| **1** | **0** | 1 | 001 |
| | **1** | 4 | 100 |
| **2** | **2** | 3 | 011 |
| | **3** | 5 | 101 |

| group | | minterms | binary |
|---|---|---|---|
| **0** | **0** | 1,3 | 0-1 |
| | **1** | 1,5 | -01 |
| | **2** | 4,5 | 10- |

| | 1 | 3 | 4 | 5 |
|---|---|---|---|---|
| **[1,3]** | 1 | 1 | 0 | 0 |
| **[1,5]** | 1 | 0 | 0 | 1 |
| **[4,5]** | 0 | 0 | 1 | 1 |

PI Table

**EPIs :** $[0-1, 10-]$

**Function :** $F = A'C + AB'$

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2. Use the Quine-McCluskey method to find a minimum SOP expression for $F(A,B,C,D) = \Sigma m(0,2,8,9,10,11)$

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| group | | minterms | binary |
|---|---|---|---|
| **0** | **0** | 0 | 0000 |
| **1** | **1** | 2 | 0010 |
| | **2** | 8 | 1000 |
| **2** | **3** | 9 | 1001 |
| | **4** | 10 | 1010 |
| **3** | **5** | 11 | 1011 |

| group | | minterms | binary |
|---|---|---|---|
| **0** | **0** | 0,2 | 00-0 |
| | **1** | 0,8 | -000 |
| **1** | **2** | 2,10 | -010 |
| | **3** | 8,9 | 100- |
| | **4** | 8,10 | 10-0 |
| **2** | **5** | 9,10 | 10-1 |
| | **6** | 10,11 | 101- |

| group | | minterms | binary |
|---|---|---|---|
| **0** | **0** | 0,2,8,10 | -0-0 |
| **1** | **1** | 0,9,10,11 | 10-- |

| | 0 | 2 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|
| **[0,2,8,10]** | 1 | 1 | 1 | 0 | 1 | 0 |
| **[8,9,10,11]** | 0 | 0 | 1 | 1 | 1 | 1 |

PI Table

**EPIs :** $[-0-0, 10--]$

**Function :** $F = B'D' + AB'$

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3. Use the Quine-McCluskey method to find a minimum SOP expression for $F(A,B,C,D,E) = \Sigma m(0,7,21,23) + \Sigma m(6,14)$

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| group | | minterms | binary |
|---|---|---|---|
| **0** | **0** | 0 | 00000 |
| **2** | **1** | 6 | 00110 |
| **3** | **2** | 7 | 00111 |
| | **3** | 14 | 01110 |
| | **4** | 21 | 10101 |
| **4** | **5** | 23 | 10111 |

| group | | minterms | binary |
|---|---|---|---|
| **1** | **0** | 6,7 | 0011- |
| | **1** | 6,14 | 0-110 |
| **2** | **2** | 7,23 | -0111 |
| | **3** | 21,23 | 101-1 |

| | 0 | 7 | 21 | 23 |
|---|---|---|---|---|
| **[0]** | 1 | 0 | 0 | 0 |
| **[6,14]** | 0 | 0 | 0 | 0 |
| **[6,7]** | 0 | 1 | 0 | 0 |
| **[7,23]** | 0 | 1 | 0 | 1 |
| **[21,23]** | 0 | 0 | 1 | 1 |

**EPIs :** $[00000, 0011-, 101-1]$

**Function :** $F = A'B'C'D'E' + A'B'CD + AB'CE$