## **SUM of PRODUCTS**

## Map

|  | $\overline{D}.\overline{E}.\overline{F}$ | $\overline{\mathrm{D}}.\overline{\mathrm{E}}.\mathrm{F}$ | $\overline{\mathrm{D}}.\mathrm{E.F}$ | $\overline{\mathrm{D}}.\mathrm{E}.\overline{\mathrm{F}}$ | $D.\overline{E}.\overline{F}$ | $D.\overline{E}.F$ | D.E.F | $D.E.\overline{F}$ |
|--|--|--|--------------------------------------|--|-------------------------------|--------------------|-------|--------------------|
| $\overline{A}.\overline{B}.\overline{C}$ | 0  | 0  | 1                                    | 0  | 0                             | 0                  | 0     | 0                  |
| $\overline{A}.\overline{B}.C$            | 0  | 0  | 0                                    | 0  | 0                             | 0                  | 0     | 0                  |
| $\overline{A}$ .B.C                      | 0  | 0  | 0                                    | 0  | 0                             | 0                  | 0     | 0                  |
| $\overline{A}.B.\overline{C}$            | 0  | 0  | 0                                    | 0  | 0                             | 0                  | 0     | 0                  |
| A.B.C                                    | X  | 0  | 0                                    | 0  | 0                             | 0                  | 0     | 0                  |
| $A.\overline{B}.C$                       | 0  | 0  | 0                                    | 0  | 0                             | 0                  | 0     | 0                  |
| A.B.C                                    | 0  | 0  | 0                                    | 0  | 0                             | 0                  | 0     | 0                  |
| $A.B.\overline{C}$                       | 0  | 0  | 0                                    | 0  | 0                             | 0                  | 0     | 0                  |

## **Map Layout**

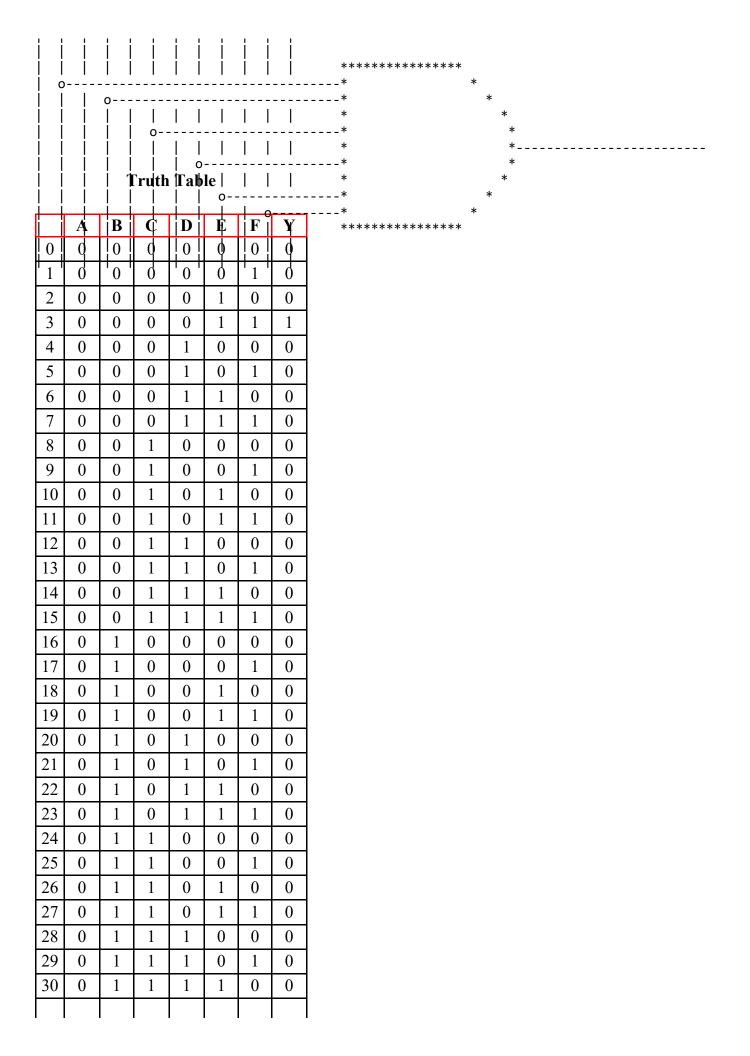
|  | $\overline{\mathrm{D}}.\overline{\mathrm{E}}.\overline{\mathrm{F}}$ | $\overline{\mathrm{D}}.\overline{\mathrm{E}}.\mathrm{F}$ | $\overline{\mathrm{D}}$ .E.F | $\overline{\mathrm{D}}.\mathrm{E}.\overline{\mathrm{F}}$ | $D.\overline{E}.\overline{F}$ | $D.\overline{E}.F$ | D.E.F | D.E. $\overline{F}$ |
|--|---|--|------------------------------|--|-------------------------------|--------------------|-------|---------------------|
| $\overline{A}.\overline{B}.\overline{C}$ | 0   | 1  | 3                            | 2  | 4                             | 5                  | 7     | 6                   |
| $\overline{A}.\overline{B}.C$            | 8   | 9  | 11                           | 10   | 12                            | 13                 | 15    | 14                  |
| $\overline{A}$ .B.C                      | 24  | 25   | 27                           | 26   | 28                            | 29                 | 31    | 30                  |
| $\overline{A}.B.\overline{C}$            | 16  | 17   | 19                           | 18   | 20                            | 21                 | 23    | 22                  |
| A.B.C                                    | 32  | 33   | 35                           | 34   | 36                            | 37                 | 39    | 38                  |
| $A.\overline{B}.C$                       | 40  | 41   | 43                           | 42   | 44                            | 45                 | 47    | 46                  |
| A.B.C                                    | 56  | 57   | 59                           | 58   | 60                            | 61                 | 63    | 62                  |
| $A.B.\overline{C}$                       | 48  | 49   | 51                           | 50   | 52                            | 53                 | 55    | 54                  |

## Groups

$$\overline{(3)}$$
  $\overline{A}.\overline{B}.\overline{C}.\overline{D}.E.F$ 

$$y = \overline{A}.\overline{B}.\overline{C}.\overline{D}.E.F$$

|     | -   |     | -   |     | -   |     | -   |     | -   |     | -   |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Α   | Α   | В   | В   | С   | С   | D   | D   | Ε   | Ε   | F   | F   |
|     |     |     |     |     |     |     |     |     |     |     |     |
| - 1 | - 1 | - 1 | - 1 | - 1 | - 1 | - 1 | - 1 | - 1 | - 1 | - 1 | - 1 |



| 31     0     1     1     1     1     1     0 |    |   |   |   |   |   |   |   |
|--|----|---|---|---|---|---|---|---|
| 33     1     0     0     0     0     1     0       34     1     0     0     0     1     0     0       35     1     0     0     0     1     1     0       36     1     0     0     1     0     0     0       37     1     0     0     1     0     1     0       38     1     0     0     1     1     0     0       39     1     0     0     1     1     0     0       40     1     0     1     0     0     0     0       41     1     0     1     0     0     0     0       42     1     0     1     0     0     0     0       43     1     0     1     0     1     0     0       43     1     0     1     1     0     0     <                                  | 31 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 34     1     0     0     0     1     0     0       35     1     0     0     0     1     1     0       36     1     0     0     1     0     0     0       37     1     0     0     1     0     1     0       38     1     0     0     1     1     0     0       39     1     0     0     1     1     1     0       40     1     0     1     0     0     0     0       41     1     0     1     0     0     0     0       42     1     0     1     0     0     0     0       43     1     0     1     0     0     0     0       45     1     0     1     1     0     0     0       47     1     0     1     1     0     0     <                                  | 32 | 1 | 0 | 0 | 0 | 0 | 0 | X |
| 35     1     0     0     0     1     1     0       36     1     0     0     1     0     0     0       37     1     0     0     1     0     1     0       38     1     0     0     1     1     0     0       39     1     0     0     1     1     1     0       40     1     0     1     0     0     0     0       41     1     0     1     0     0     0     0       42     1     0     1     0     1     0     0       43     1     0     1     0     0     0     0       44     1     0     1     1     0     0     0       45     1     0     1     1     0     0     0       47     1     0     1     1     1     0     <                                  | 33 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 36     1     0     0     1     0     0       37     1     0     0     1     0     1     0       38     1     0     0     1     1     0     0       39     1     0     0     1     1     1     0       40     1     0     1     0     0     0     0       41     1     0     1     0     0     0     0       41     1     0     1     0     0     1     0       42     1     0     1     0     1     0     0       43     1     0     1     0     1     1     0       44     1     0     1     1     0     0     0       45     1     0     1     1     1     0     0       47     1     0     1     1     1     0     0  | 34 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 37     1     0     0     1     0     1     0       38     1     0     0     1     1     0     0       39     1     0     0     1     1     1     0       40     1     0     1     0     0     0     0       41     1     0     1     0     0     1     0       42     1     0     1     0     1     0     0       43     1     0     1     0     1     1     0       44     1     0     1     1     0     0     0       45     1     0     1     1     0     1     0       46     1     0     1     1     1     0     0       47     1     0     1     1     1     0     0       49     1     1     0     0     0     0     <                                  | 35 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| 38     1     0     0     1     1     0     0       39     1     0     0     1     1     1     0       40     1     0     1     0     0     0     0       41     1     0     1     0     0     1     0       41     1     0     1     0     0     1     0       42     1     0     1     0     1     0     0       43     1     0     1     0     1     1     0       44     1     0     1     1     0     0     0       45     1     0     1     1     0     0     0       45     1     0     1     1     0     0     0       47     1     0     1     1     1     0     0       48     1     1     0     0     1     0     <                                  | 36 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 39     1     0     0     1     1     1     0       40     1     0     1     0     0     0     0       41     1     0     1     0     0     0     0       42     1     0     1     0     1     0     0       43     1     0     1     0     1     1     0       44     1     0     1     1     0     0     0       45     1     0     1     1     0     0     0       45     1     0     1     1     0     0     0       45     1     0     1     1     0     0     0       46     1     0     1     1     1     0     0       47     1     0     1     1     1     0     0       50     1     1     0     0     1     0     <                                  | 37 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 40     1     0     1     0     0     0       41     1     0     1     0     0     1     0       42     1     0     1     0     1     0     0       43     1     0     1     0     1     1     0       44     1     0     1     1     0     0     0       45     1     0     1     1     0     1     0       46     1     0     1     1     1     0     0       47     1     0     1     1     1     0     0       48     1     1     0     0     0     0     0       50     1     1     0     0     1     0     0       51     1     1     0     0     1     0     0       52     1     1     0     1     0     0     0  | 38 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| 41     1     0     1     0     0     1     0       42     1     0     1     0     1     0     0       43     1     0     1     0     1     1     0       44     1     0     1     1     0     0     0       45     1     0     1     1     0     1     0       46     1     0     1     1     1     0     0       47     1     0     1     1     1     0     0       48     1     1     0     0     0     0     0       49     1     1     0     0     0     0     0       50     1     1     0     0     1     0     0       51     1     1     0     0     1     0     0       52     1     1     0     1     1     0     <                                  | 39 | 1 | 0 | 0 | 1 | 1 | 1 | 0 |
| 42     1     0     1     0     1     0     0       43     1     0     1     0     1     1     0       44     1     0     1     1     0     0     0       45     1     0     1     1     0     1     0       46     1     0     1     1     1     0     0       47     1     0     1     1     1     1     0       48     1     1     0     0     0     0     0       49     1     1     0     0     0     0     0       50     1     1     0     0     1     0     0       51     1     1     0     0     1     0     0       51     1     1     0     1     0     0     0       52     1     1     0     1     1     0     <                                  | 40 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 43   1   0   1   0   1   1   0     44   1   0   1   1   0   0   0     45   1   0   1   1   0   1   0     46   1   0   1   1   1   0   0     47   1   0   1   1   1   1   0     48   1   1   0   0   0   0   0     49   1   1   0   0   0   0   0     50   1   1   0   0   1   0   0     51   1   1   0   0   1   0   0     51   1   1   0   0   1   0   0     52   1   1   0   1   0   0   0     53   1   1   0   1   1   0   0     54   1   1   0   1   1   0   0 <t< td=""><td>41</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td></t<>  | 41 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| 44   1   0   1   1   0   0   0     45   1   0   1   1   0   1   0     46   1   0   1   1   1   0   0     47   1   0   1   1   1   1   0   0     48   1   1   0   0   0   0   0   0     49   1   1   0   0   0   0   0   0     50   1   1   0   0   1   0   0   0     51   1   1   0   0   1   0   0   0   0     51   1   1   0   1   0   | 42 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 45   1   0   1   1   0   1   0     46   1   0   1   1   1   0   0     47   1   0   1   1   1   1   0   0     48   1   1   0   0   0   0   0   0     49   1   1   0   0   0   1   0   0     50   1   1   0   0   1   0  | 43 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| 46   1   0   1   1   1   0   0     47   1   0   1   1   1   1   0     48   1   1   0   0   0   0   0     49   1   1   0   0   0   1   0     50   1   1   0   0   1   0   0     51   1   1   0   0   1   1   0     52   1   1   0   1   0   0   0     53   1   1   0   1   0   0   0     54   1   1   0   1   1   0   0     55   1   1   0   1   1   0   0     57   1   1   1   0   0   0   0     58   1   1   1   0   1   0   0     59   1   1   1   1   0   0   0 <t< td=""><td>44</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td></t<>  | 44 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| 47   1   0   1   1   1   1   0     48   1   1   0   0   0   0   0     49   1   1   0   0   0   1   0     50   1   1   0   0   1   0   0     51   1   1   0   0   1   1   0     51   1   1   0   0   1   1   0     52   1   1   0   1   0   0   0     53   1   1   0   1   0   0   0     54   1   1   0   1   1   0   0     55   1   1   0   1   1   0   0     57   1   1   1   0   0   0   0     58   1   1   1   0   1   0   0     59   1   1   1   1   0   0   0 <t< td=""><td>45</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td></t<>  | 45 | 1 | 0 | 1 | 1 | 0 | 1 | 0 |
| 48     1     1     0     0     0     0     0       49     1     1     0     0     0     1     0       50     1     1     0     0     1     0     0       51     1     1     0     0     1     1     0       51     1     1     0     1     0     0     0       52     1     1     0     1     0     0     0       53     1     1     0     1     0     1     0       54     1     1     0     1     1     0     0       55     1     1     0     1     1     1     0       56     1     1     1     0     0     0     0       57     1     1     1     0     1     0     0       59     1     1     1     1     0     0     <                                  | 46 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| 49   1   1   0   0   0   1   0     50   1   1   0   0   1   0   0     51   1   1   0   0   1   1   0     52   1   1   0   1   0   0   0     53   1   1   0   1   0   1   0     54   1   1   0   1   1   0   0     55   1   1   0   1   1   1   0     56   1   1   1   0   0   0   0     57   1   1   1   0   0   1   0     58   1   1   1   0   1   0   0     59   1   1   1   0   0   0     60   1   1   1   1   0   0     61   1   1   1   1   0   0     62   1   1 </td <td>47</td> <td>1</td> <td>0</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>0</td>  | 47 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |
| 50     1     1     0     0     1     0     0       51     1     1     0     0     1     1     0       52     1     1     0     1     0     0     0       53     1     1     0     1     0     1     0       54     1     1     0     1     1     0     0       55     1     1     0     1     1     1     0       56     1     1     1     0     0     0     0       57     1     1     1     0     0     1     0       58     1     1     1     0     1     0     0       59     1     1     1     0     0     0       60     1     1     1     1     0     0       61     1     1     1     1     0     0       62   | 48 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 51     1     1     0     0     1     1     0       52     1     1     0     1     0     0     0       53     1     1     0     1     0     1     0       54     1     1     0     1     1     0     0       55     1     1     0     1     1     1     0       56     1     1     1     0     0     0     0       57     1     1     1     0     0     1     0       58     1     1     1     0     1     0     0       59     1     1     1     0     1     1     0       60     1     1     1     1     0     0     0       61     1     1     1     1     0     0     0       62     1     1     1     1     1     0     <                                  | 49 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| 52     1     1     0     1     0     0     0       53     1     1     0     1     0     1     0       54     1     1     0     1     1     0     0       55     1     1     0     1     1     1     0       56     1     1     1     0     0     0     0       57     1     1     1     0     0     1     0       58     1     1     1     0     1     0     0       59     1     1     1     0     1     1     0       60     1     1     1     1     0     0     0       61     1     1     1     1     0     0     0       62     1     1     1     1     1     0     0   | 50 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| 53     1     1     0     1     0     1     0       54     1     1     0     1     1     0     0       55     1     1     0     1     1     1     0       56     1     1     1     0     0     0     0       57     1     1     1     0     0     1     0       58     1     1     1     0     1     0     0       59     1     1     1     0     1     1     0       60     1     1     1     1     0     0     0       61     1     1     1     1     0     1     0       62     1     1     1     1     1     0     0  | 51 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |
| 54     1     1     0     1     1     0     0       55     1     1     0     1     1     1     0       56     1     1     1     0     0     0     0       57     1     1     1     0     0     1     0       58     1     1     1     0     1     0     0       59     1     1     1     0     1     1     0       60     1     1     1     1     0     0     0       61     1     1     1     1     0     1     0       62     1     1     1     1     1     0     0   | 52 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| 55 1 1 0 1 1 1 0   56 1 1 1 0 0 0 0   57 1 1 1 0 0 1 0   58 1 1 1 0 1 0 0   59 1 1 1 0 1 1 0   60 1 1 1 1 0 0 0   61 1 1 1 1 0 0   62 1 1 1 1 1 0 0  | 53 | 1 | 1 | 0 | 1 | 0 | 1 | 0 |
| 56 1 1 1 0 0 0 0   57 1 1 1 0 0 1 0   58 1 1 1 0 1 0 0   59 1 1 1 0 1 1 0   60 1 1 1 1 0 0 0   61 1 1 1 1 0 0 0   62 1 1 1 1 1 0 0   | 54 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| 57     1     1     1     0     0     1     0       58     1     1     1     0     1     0     0       59     1     1     1     0     1     1     0       60     1     1     1     1     0     0     0       61     1     1     1     1     0     1     0       62     1     1     1     1     1     0     0  | 55 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| 58     1     1     1     0     1     0     0       59     1     1     1     0     1     1     0       60     1     1     1     1     0     0     0       61     1     1     1     1     0     1     0       62     1     1     1     1     1     0     0   | 56 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| 59 1 1 1 0 1 1 0   60 1 1 1 1 0 0 0   61 1 1 1 1 0 1 0   62 1 1 1 1 1 0 0  | 57 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| 60 1 1 1 1 0 0 0   61 1 1 1 1 0 1 0   62 1 1 1 1 1 0 0   | 58 | 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| 61 1 1 1 1 0 1 0   62 1 1 1 1 1 0 0  | 59 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| 62 1 1 1 1 1 0 0   | 60 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
|  | 61 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 63 1 1 1 1 1 1 0   | 62 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
|  | 63 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |