1.

A	B	C	D	Out
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

CD

AB	00	01	11	10
00	0	1	0	0
01	0	1	0	0
11	0	1	1	0
10	0	1	1	1

2.

To minimize the given Boolean expression using the four-variable Karnaugh map, follow these steps:

Step 1: Create the Karnaugh map with rows and columns representing all possible combinations of A, B, C, and D.

```
   CD
 AB | 00 | 01 | 11 | 10 |
 ------------------------
  00 |  |  |  |  |
 ------------------------
  01 |  |  |  |  |
 ------------------------
  11 |  |  |  |  |
 ------------------------
  10 |  |  |  |  |
 ------------------------
```

Step 2: Fill in the K-map with the given minterms (1, 5, 6, 12, 13, 14) and don't cares (2, 4).

```
    CD
 AB | 00 | 01 | 11 | 10 |
 -----------------------
  00 | 1 |   |   |   |
 -----------------------
  01 |   | 1 |   |   |
 -----------------------
  11 |   |   | 1 |   |
 -----------------------
  10 |   |   |   | 1 |
 -----------------------
```

Step 3: Group adjacent 1s in powers of 2 (1, 2, 4, 8, etc.) to form groups in the K-map.

```
    CD
 AB | 00 | 01 | 11 | 10 |
 -----------------------
  00 | 1 | 1 | 1 |   |
 -----------------------
  01 |   | 1 | 1 |   |
 -----------------------
  11 |   | 1 | 1 |   |
 -----------------------
  10 | 1 |   |   | 1 |
 -----------------------
```

Step 4: Determine the simplified expressions for each group.

Group 1: AB = 00
Minterms: 1, 5, 6, 12

For AB = 00, the value of C and D can be either 00, 01, 11, or 10. In this case, the output is always 1. So the simplified expression for this group is simply 1.

Group 2: AB = 01
Minterms: 13, 14

For AB = 01, the value of C and D can be 00 or 01. In this case, the output is always 1. So the simplified expression for this group is also 1.

Group 3: AB = 10
Minterm: 10

For AB = 10, the value of C and D can be 00 or 10. In this case, the output is always 1. So the simplified expression for this group is 1.

Group 4: AB = 11
Minterm: None

There are no minterms for AB = 11. It means that this group does not contribute to the output.

Step 5: Write down the minimized Boolean expression.

$F(A, B, C, D) = \Sigma m(1, 5, 6, 12) + \Sigma m(13, 14) + \Sigma m(10)$

Simplified: $F(A, B, C, D) = 1$

The minimized Boolean expression for the given function F(A, B, C, D) is simply F(A, B, C, D) = 1.