**2.1 证明**

(1)+AB=(+B)(A+)

右边=(+B) (A+)=A++AB+B=+AB

(2)(A+B)(+C)(B+C)=(A+B)(+C)

左边=(AC+B+BC)(B+C)=ABC+B+BC+AC+BC+BC=B+BC+AC=B+AC

右边=A+AC+B+BC=AC+B

(3)=+

∵AB(+)=AB+AB=0+0=0

AB+(+)=AB++=B++=1

∴=1+0=(AB+(+))+AB(+)

= (+)+AB(+)= (+AB) (+)= +

(4)=B+A

左边==(A+B)(+)=A+B

(5)AB+C+C=AB+C

左边=AB+C+AB+C

(6)AB+C+A=A+C

左边=AB+C+A=A(B+)+C=A+C(7)A+BD+

左边=A+D+DC=A+D+DC=A

(8)+C

左边=+C++C

(9) AB+BC+CA=(A+B)(B+C)(C+A)

左边=(AB+AC+B+BC)(C+A)

=(AC+B)(C+A)=AC+BC+AB=AB+BC+CA

(10)ABC+=

左边= =(+B)( (+A)=+C+B+BC)(+A)=+ABC

(11)WZ+YWZ+XV+VWZ=

左边=WZ+XV+VWZ=WZ+ XV=WZ+YWZ+ XV

(12)XZ+ + XW+ZW=XZ+ Z+ XW

左边=Z+ W+ZW=Z+ W =XZ+ Z+W

(13)AB+ A+C+B+

左边=AD+ADE

=A+CD=A+D+C

(14)(X+Y+Z+

原式两边取非：**=**

右边==

=()(

**2.2证明**

(1)若 A,则 AC+ =BC+

证明：

AC+

==BC+

(2) 若 A则 C+ =B

证明：C+ =A()+=AB+ B=B

(3)若A+B=A+C, +B=+C,则B=C

证明：B=B 1+0=B(A+)+A

=AB+

=A(

**2.4用反演规则写反函数**

(1）F1=AB

=(+B)(A+

(2) F2=+

=+

(3)F3=(A+

=(B+

(4)F4=+(+C)

=A(B+

**2.5写对偶函数**

(1)G1=A+AB(C+A

G1\*=( A+[A+B+C(A+

(2)G2=(

G2\*=(

(3)G3=A(

G3\*=(A++

(4)G4=

G4\*=

**2.9做K图**

(1)F1(ABCD)=AB++C

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

(2)F2(ABCD)= BD+A+BC

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

(3)F3(ABCD)=A(+

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

(4)F4(ABC)=

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  C | 00 | 01 | 11 | 10 |
| 0 | 1 | 0 | 0 | 1 |
| 1 | 1 | 0 | 1 | 0 |

(5)F5(ABCD)=(B+CD)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 | 0 | 1 | 1 | 0 |
| 01 | 0 | 1 | 1 | 0 |
| 11 | 0 | 1 | 1 | 0 |
| 10 | 0 | 1 | 1 | 0 |

(6)F6(ABCD)=

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 | 1 | 0 | 1 | 1 |
| 01 | 1 | 1 | 1 | 0 |
| 11 | 1 | 0 | 1 | 1 |
| 10 | 1 | 0 | 1 | 1 |

**2.6代数法化简**

(1)F1=A+=A(+(=A+=1

(2)F2=A

(3)==

(4)F4=A

(5)F5=ABC+=1

(6)F6=

(7)F7===

(8)F8=Z=+Z

(9)F9=Z=ZABC+=B(ZAC+)=ZBC+

(10)F10=(XY+Z)=(XY+Z)=Z=

(11)F11=AB(=ABCDE+B=ABC+B=ABC+B+B

(12)

(13)

(14)

(15)

(16)

**2.9 作出下列函数的卡诺图**

(2)

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

(4)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  C | 00 | 01 | 11 | 10 |
| 0 | 1 | 0 | 0 | 1 |
| 1 | 1 | 0 | 1 | 0 |

(5)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 | 0 | 1 | 1 | 0 |
| 01 | 0 | 1 | 0 | 0 |
| 11 | 0 | 1 | 0 | 1 |
| 10 | 0 | 1 | 1 | 0 |

(6)

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 | 1 | 0 | 1 | 1 |
| 01 | 1 | 1 | 1 | 0 |
| 11 | 1 | 0 | 1 | 1 |
| 10 | 1 | 0 | 1 | 1 |

**2.10 K图法化简函数**

(1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  C | 00 | 01 | 11 | 10 |
| 0 | 1 |  | 1 |  |
| 1 | 1 |  | 1 | 1 |

(2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  C | 00 | 01 | 11 | 10 |
| 0 |  | 1 | 1 |  |
| 1 |  | 1 |  |  |

(3)

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

(4)

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

(5)

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

(6)

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

(7)

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

(8)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 | 0 | 1 | 1 | 1 |
| 01 | 1 | 1 | 1 | 1 |
| 11 | 1 | 0 | 1 | 1 |
| 10 | 1 | 1 | 1 | 1 |

(9)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 | 1 | 0 | 0 | 0 |
| 01 | 1 | 0 | 0 | 1 |
| 11 | 0 | 0 | 0 | 1 |
| 10 | 1 | 0 | 0 | 1 |

(10)

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

(11)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 | 0 |  |  | 0 |
| 01 |  |  |  |  |
| 11 |  |  |  |  |
| 10 | 0 |  |  | 0 |

(12)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 |  | 0 | 0 |  |
| 01 |  | 0 | 0 |  |
| 11 | 0 |  | 0 |  |
| 10 | 0 |  | 0 |  |

(13)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ABC  DE | 000 | 001 | 011 | 010 | 110 | 111 | 101 | 100 |
| 00 |  |  | 1 | 1 | 1 | 1 |  | 1 |
| 01 | 1 |  |  | 1 |  |  |  |  |
| 11 | 1 | 1 |  | 1 |  |  | 1 |  |
| 10 |  | 1 | 1 |  |  | 1 | 1 | 1 |

(14)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ABC  DE | 000 | 001 | 011 | 010 | 110 | 111 | 101 | 100 |
| 00 | 1 | 1 |  | 1 | 1 |  | 1 | 1 |
| 01 |  |  |  |  | 1 | 1 |  |  |
| 11 | 1 | 1 | 1 | 1 | 1 | 1 |  |  |
| 10 |  | 1 |  |  |  |  | 1 |  |

(15)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ABC  DE | 000 | 001 | 011 | 010 | 110 | 111 | 101 | 100 |
| 00 |  |  | 1 |  | 1 | 1 |  | 1 |
| 01 |  | 1 | 1 |  | 1 | 1 | 1 | 1 |
| 11 |  | 1 | 1 |  |  | 1 | 1 |  |
| 10 |  |  | 1 |  |  | 1 |  |  |

(16)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CD  EF | 00 | 01 | 11 | 10 | 10 | 11 | 01 | 00 |
| 00 | 1 |  |  | 1 |  |  |  |  |
| 01 | 1 | 1 |  | 1 |  |  | 1 | 1 |
| 11 |  |  |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |  |  |
| 11 |  |  |  | 1 |  |  |  |  |
| 01 | 1 | 1 | 1 | 1 |  |  | 1 | 1 |
| 00 |  |  |  |  |  |  |  |  |

**2.11 用K图化简函数**

(1),且

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 | 1 | \* |  | \* |
| 01 | \* | \* | 1 |  |
| 11 | \* | 1 | 1 |  |
| 10 | 1 | \* |  | \* |

(2)且ABCD不能全相同

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 | \* |  | 1 | 1 |
| 01 |  |  | 1 | 1 |
| 11 |  |  | \* |  |
| 10 | 1 |  |  | 1 |

(3)且AB=0

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 | 1 | \* |  | \* |
| 01 | 1 | \* |  | \* |
| 11 |  | \* | 1 | \* |
| 10 | 1 | \* | 1 | \* |

(4)且

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 | 1 | 1 | 1 |  |
| 01 |  | \* | 1 |  |
| 11 |  | \* |  |  |
| 10 | 1 | \* | \* | \* |

(5)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 |  |  |  |  |
| 01 | \* |  | 1 | 1 |
| 11 | 1 | 1 | \* | 1 |
| 10 | 1 |  |  | \* |

(6)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 |  | 1 |  | \* |
| 01 |  | 1 | 1 | \* |
| 11 |  |  | 1 |  |
| 10 |  | 1 | 1 | \* |

(7)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 |  | 1 | 1 |  |
| 01 | \* |  | \* |  |
| 11 | \* | 1 | 1 | \* |
| 10 |  |  | 1 | 1 |

(8)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 | 1 | 1 | 1 | \* |
| 01 | 1 | 0 | 0 | \* |
| 11 | 0 | 1 | 1 | 0 |
| 10 | 0 | 1 | 1 | 0 |

(9)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ABC  DE | 000 | 001 | 011 | 010 | 110 | 111 | 101 | 100 |
| 00 | 0 | 0 | 0 | 0 | \* | \* | 0 | 0 |
| 01 |  | \* | \* |  | 0 | 0 |  |  |
| 11 |  | \* | \* |  | 0 | 0 |  |  |
| 10 | 0 | 0 | 0 | 0 | \* | \* | 0 | 0 |

(10)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ABC  DE | 000 | 001 | 011 | 010 | 110 | 111 | 101 | 100 |
| 00 | 0 |  |  | 0 | 0 | 0 | 0 | 0 |
| 01 | 0 |  | \* | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 |  |  |  |  | 0 |  | \* |
| 10 | 0 |  | \* |  |  | 0 |  |  |

**2.12 化简多输出函数为与或表达式，使整体最简**

(1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  C | 00 | 01 | 11 | 10 |
| 0 |  | 1 | 1 | 1 |
| 1 | 1 | 1 |  | 1 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  C | 00 | 01 | 11 | 10 |
| 0 |  | 1 |  |  |
| 1 | 1 | 1 |  | 1 |

(2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  C | 00 | 01 | 11 | 10 |
| 0 |  |  | 1 | 1 |
| 1 | 1 | 1 |  | 1 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  C | 00 | 01 | 11 | 10 |
| 0 |  | 1 |  | 1 |
| 1 | 1 | 1 |  | 1 |

(3)

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

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

**2.13 转换表达式形式**

(1) 转为与非—与非式

(2) 转为无反变量的多级与非式

(3) 转为与-或非式

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

(4) 转为或—与式

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

(5) 写出与或式，与或非式，或与式

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 | \* | 1 |  |  |
| 01 | \* |  | 1 | 1 |
| 11 |  | 1 | \* | 1 |
| 10 | 1 |  |  | \* |

合并1单元： (与或)

合并0单元：

(6) 写出与或式，或与，与或非

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 |  | 1 |  | \* |
| 01 |  | 1 | 1 | \* |
| 11 |  |  | 1 |  |
| 10 |  | 1 | 1 | \* |

(7)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB  CD | 00 | 01 | 11 | 10 |
| 00 |  | 0 | 0 |  |
| 01 | \* |  | \* |  |
| 11 | \* | 0 | 0 | \* |
| 10 |  |  | 0 | 0 |

(8) 转为或非—或非式

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