Санкт-Петербургский Национальный Исследовательский  
Университет ИТМО

Факультет программной инженерии и компьютерной техники

**Домашняя работа №1**

По дискретной математике

Вариант 76

Выполнил:

Студент группы P3117

Васильченко Роман Антонович

Преподаватель:

Поляков Владимир Иванович



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Table

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 | X12 | ri |
| X1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 4 |
| X2 |  | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 5 |
| X3 |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| X4 |  |  |  | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| X5 |  |  |  |  | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 5 |
| X6 |  |  |  |  |  | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 6 |
| X7 |  |  |  |  |  |  | 0 | 1 | 1 | 1 | 1 | 1 | 7 |
| X8 |  |  |  |  |  |  |  | 0 | 0 | 0 | 1 | 0 | 3 |
| X9 |  |  |  |  |  |  |  |  | 0 | 0 | 0 | 1 | 3 |
| X10 |  |  |  |  |  |  |  |  |  | 0 | 0 | 0 | 4 |
| X11 |  |  |  |  |  |  |  |  |  |  | 0 | 0 | 5 |
| X12 |  |  |  |  |  |  |  |  |  |  |  | 0 | 4 |

Max ri = r7 = 7, выбираем X7;

Гx7 = {X5, X6, X8, X9, X10, X11, X12}; C7 = (X7 ∨ X5X6X8X9X10X11X12)

Из матрицы R удаляем строку и столбец, соответствующие вершине X7;

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X2 | X3 | X4 | X5 | X6 | X8 | X9 | X10 | X11 | X12 | ri |
| X1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 4 |
| X2 |  | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 5 |
| X3 |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| X4 |  |  |  | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| X5 |  |  |  |  | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 4 |
| X6 |  |  |  |  |  | 0 | 0 | 0 | 1 | 1 | 1 | 5 |
| X8 |  |  |  |  |  |  | 0 | 0 | 0 | 1 | 0 | 2 |
| X9 |  |  |  |  |  |  |  | 0 | 0 | 0 | 1 | 2 |
| X10 |  |  |  |  |  |  |  |  | 0 | 0 | 0 | 3 |
| X11 |  |  |  |  |  |  |  |  |  | 0 | 0 | 4 |
| X12 |  |  |  |  |  |  |  |  |  |  | 0 | 3 |

Max ri = r2 = r6 = 5, выбираем X2;

Гx2 = {X1, X4, X5, X11, X12}; C2 = (X2 ∨ X1X4X5X11X12)

Из матрицы R удаляем строку и столбец, соответствующие вершине X2;

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X3 | X4 | X5 | X6 | X8 | X9 | X10 | X11 | X12 | ri |
| X1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 3 |
| X3 |  | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| X4 |  |  | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| X5 |  |  |  | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 3 |
| X6 |  |  |  |  | 0 | 0 | 0 | 1 | 1 | 1 | 5 |
| X8 |  |  |  |  |  | 0 | 0 | 0 | 1 | 0 | 2 |
| X9 |  |  |  |  |  |  | 0 | 0 | 0 | 1 | 2 |
| X10 |  |  |  |  |  |  |  | 0 | 0 | 0 | 3 |
| X11 |  |  |  |  |  |  |  |  | 0 | 0 | 3 |
| X12 |  |  |  |  |  |  |  |  |  | 0 | 2 |

Max ri = r6=5, выбираем X6;

Гx6 = {X1, X4, X10, X11, X12}; C6 = (X6 ∨ X1X4X10X11X12)

Из матрицы R удаляем строку и столбец, соответствующие вершине X6;

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X3 | X4 | X5 | X8 | X9 | X10 | X11 | X12 | ri |
| X1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 |
| X3 |  | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| X4 |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| X5 |  |  |  | 0 | 1 | 1 | 1 | 0 | 0 | 3 |
| X8 |  |  |  |  | 0 | 0 | 0 | 1 | 0 | 2 |
| X9 |  |  |  |  |  | 0 | 0 | 0 | 1 | 2 |
| X10 |  |  |  |  |  |  | 0 | 0 | 0 | 2 |
| X11 |  |  |  |  |  |  |  | 0 | 0 | 2 |
| X12 |  |  |  |  |  |  |  |  | 0 | 1 |

Max ri = r5=3, выбираем X5;

Гx5 = {X8, X9, X10 }; C5 = (X5 ∨ X8X9X10)

Из матрицы R удаляем строку и столбец, соответствующие вершине X5;

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X1 | X3 | X4 | X8 | X9 | X10 | X11 | X12 | ri |
| X1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 2 |
| X3 |  | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| X4 |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| X8 |  |  |  | 0 | 0 | 0 | 1 | 0 | 1 |
| X9 |  |  |  |  | 0 | 0 | 0 | 1 | 1 |
| X10 |  |  |  |  |  | 0 | 0 | 0 | 1 |
| X11 |  |  |  |  |  |  | 0 | 0 | 2 |
| X12 |  |  |  |  |  |  |  | 0 | 1 |

Max ri = r1=r3=r11=2, выбираем X1;

Гx1 = {X3, X11 }; C1 = (X1 ∨ X3X11)

Из матрицы R удаляем строку и столбец, соответствующие вершине X1;

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | X3 | X4 | X8 | X9 | X10 | X11 | X12 | ri |
| X3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| X4 |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| X8 |  |  | 0 | 0 | 0 | 1 | 0 | 1 |
| X9 |  |  |  | 0 | 0 | 0 | 1 | 1 |
| X10 |  |  |  |  | 0 | 0 | 0 | 1 |
| X11 |  |  |  |  |  | 0 | 0 | 1 |
| X12 |  |  |  |  |  |  | 0 | 1 |

Max ri = r3=r8=r9=r10=r11=r12=1, выбираем X3;

Гx3 = {X10 }; C3 = (X3 ∨ X10)

Из матрицы R удаляем строку и столбец, соответствующие вершине X3;

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | X4 | X8 | X9 | X10 | X11 | X12 | ri |
| X4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| X8 |  | 0 | 0 | 0 | 1 | 0 | 1 |
| X9 |  |  | 0 | 0 | 0 | 1 | 1 |
| X10 |  |  |  | 0 | 0 | 0 | 0 |
| X11 |  |  |  |  | 0 | 0 | 1 |
| X12 |  |  |  |  |  | 0 | 1 |

Max ri = r8=r9=r11=r12=1, выбираем X8;

Гx8 = {X11 }; C8 = (X8 ∨ X11)

Из матрицы R удаляем строку и столбец, соответствующие вершине X8;

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | X4 | X9 | X10 | X11 | X12 | ri |
| X4 | 0 | 0 | 0 | 0 | 0 | 0 |
| X9 |  | 0 | 0 | 0 | 1 | 1 |
| X10 |  |  | 0 | 0 | 0 | 0 |
| X11 |  |  |  | 0 | 0 | 0 |
| X12 |  |  |  |  | 0 | 1 |

Max ri = r9=r12=1, выбираем X9;

Гx9 = {X12 }; C9 = (X9 ∨ X12)

Из матрицы R удаляем строку и столбец, соответствующие вершине X9;

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | X4 | X10 | X11 | X12 | ri |
| X4 | 0 | 0 | 0 | 0 | 0 |
| X10 |  | 0 | 0 | 0 | 0 |
| X11 |  |  | 0 | 0 | 0 |
| X12 |  |  |  | 0 | 0 |

*R* =∅;

Составляем конъюнкцию *Ci* и выполняем минимизацию

*П =* ∧*Ci* = *C1 C2 C3 C5 C6 C7 C8 C9* = (X1 ∨ X3X11) (X2 ∨ X1X4X5X11X12) (X3 ∨ X10) (X5 ∨ X8X9X10) (X6 ∨ X1X4X10X11X12) (X7 ∨ X5X6X8X9X10X11X12) (X8 ∨ X11) (X9 ∨ X12)

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