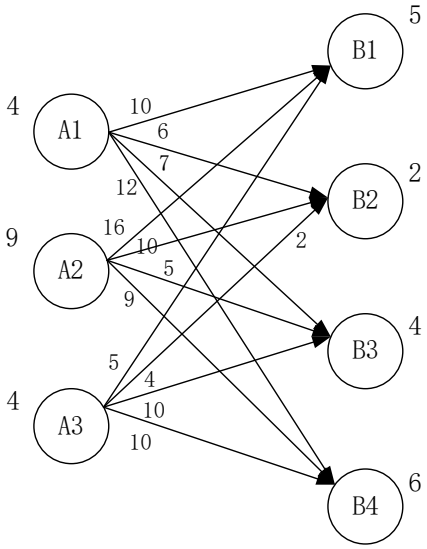
运筹学第十四次作业参考答案

1. 求如下优化问题的最优解和最优值：

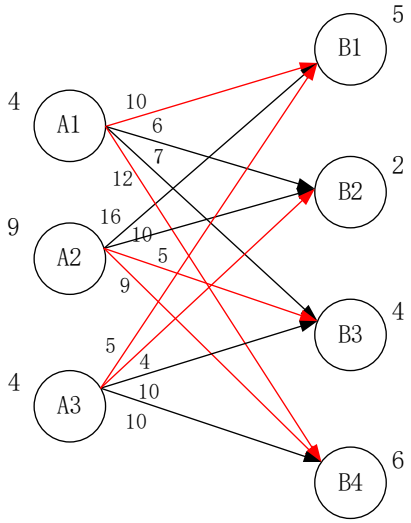
$$\begin{cases}\min 10x_1+6x_2+7x_3+12x_4+16x_5+10x_6+5x_7+9x_8+5x_9+4x_{10}+10x_{11}+10x_{12}\\ \text{s.t. } x_1+x_2+x_3+x_4=4, x_5+x_6+x_7+x_8=9, x_9+x_{10}+x_{11}+x_{12}=4\\ \quad x_1+x_5+x_9=5, x_2+x_6+x_{10}=2, x_3+x_7+x_{11}=4, x_4+x_8+x_{12}=6\\ \quad x_i\geq 0 \text{ 且为整数}(i=1,\dots,12)\end{cases}$$

解：

转化为运输问题：

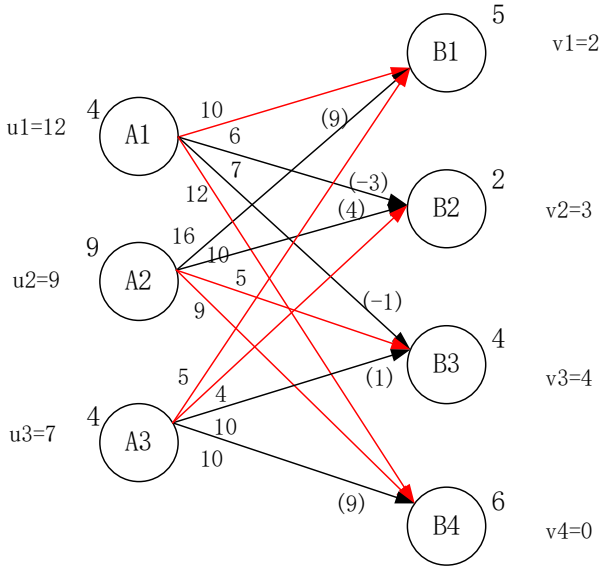


使用最小元素法产生基本可行解

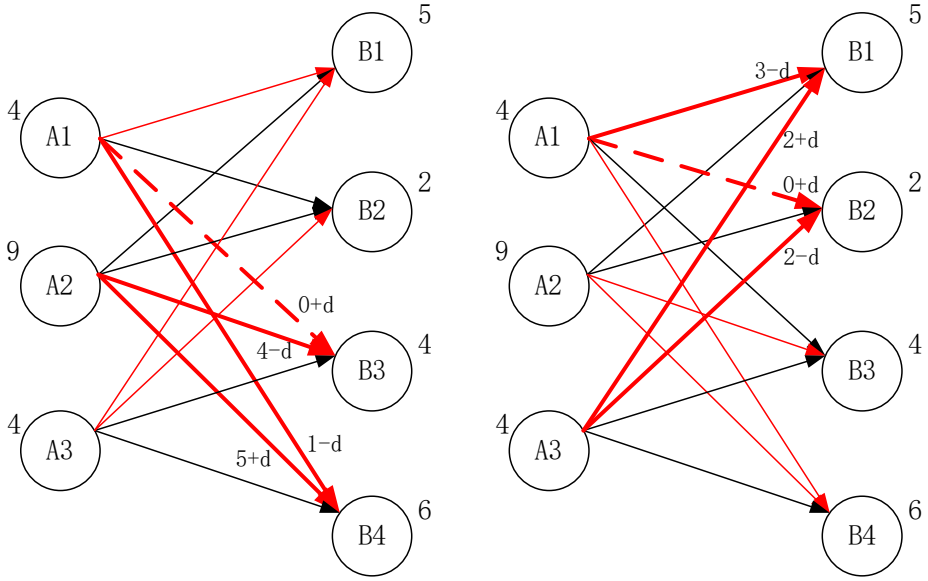


x	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4
单位成本	10	6	7	12	16	10	5	9	5	4	10	10
可行解	3	0	0	1	0	0	4	5	2	2	0	0

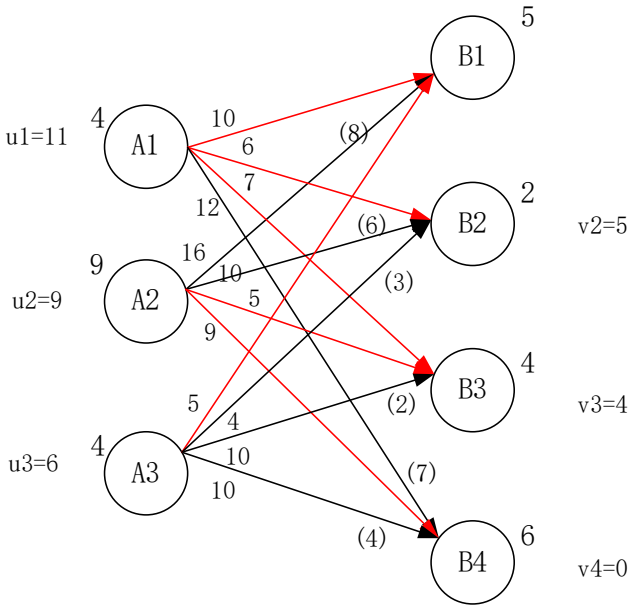
计算对偶变量（位势法），并计算检验数



$\sigma_{12}<0,\sigma_{13}<0$在两个回路中分别改进基本可行解



x	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4
左	3	0	1	0	0	0	3	6	2	2	0	0
右	1	2	1	0	0	0	3	6	4	0	0	0



所有检验数不小于 0，已达到最优解。

最优解为$X = (1,2,1,0,0,0,3,6,4,0,0,0)^T$，最优值为 118。