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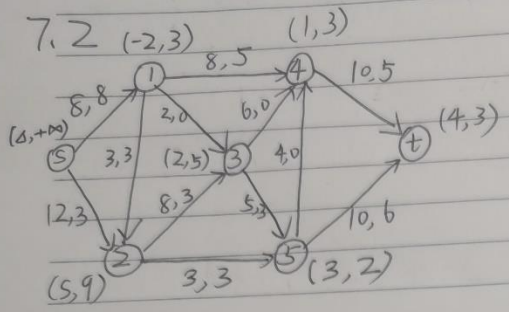
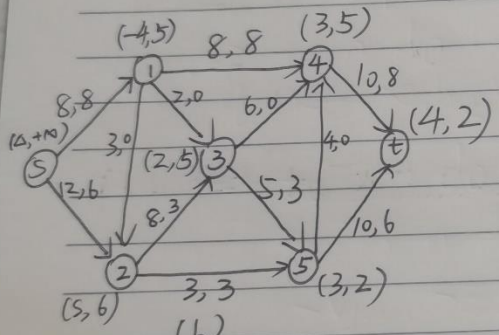
赤阪裕玮

7.2



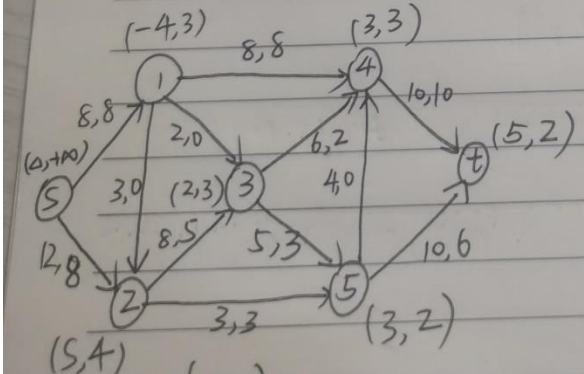
(a)

S(2)
2(1,3)
1(4)
3(5)
4(t)



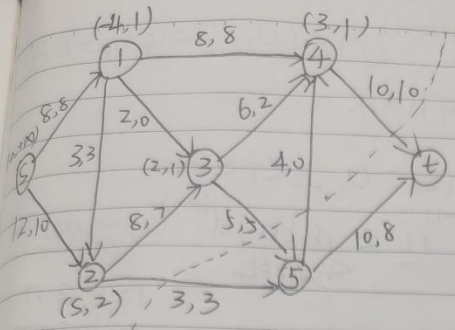
(b)

S(2)
2(3)
3(4,5)
4(1,t)



(c)

S(2)
2(3)
3(4,5)
4(1)
5(t)



(d)

$X=\{s,1,2,3,4\}$

$V-X=\{5,t\}$

最小割集：

$(X,V-X)=\{\langle 2,5\rangle,\langle 3,5\rangle,\langle 4,t\rangle\}$

$v(f_{max})=8+10=18=3+5+10$

$=c(X,V-X)$

7.10

① 构造 $N=\langle V',E',c,s,t\rangle$

② 求 N 的最大流 f_{max}

③ 根据 f_{max} 构造 D 的顶点不相交的 $s-t$ 路径集合

Dicnic算法时间复杂度为 $O(mn^2)$

7.12 (1) $d^{(0)}(1)=0$, $d^{(0)}(i)=+\infty$, $2\le i\le n$

$$d^{(k)}(i)=\min\left\{d^{(k-1)}(i),\min\left\{d^{(k-1)}(j)+w_{ji}\mid \langle v_j,v_i\rangle\in E\right\}\right\}$$

$1\le i\le n, k\ge 1$

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(2) 记 $j^{(k)}(i)$ 为使 $d^{(k-1)}(j)+w_{ji}$ ($<v_j,v_i>\in E$) 取到最小值的 v_j 的下标

$h^{(0)}(1)=1$, $h^{(0)}(i)=0$, $2\le i\le n$

$$h^{(k)}(i)=\begin{cases} h^{(k-1)}(i), & d^{(k-1)}(i)\le \min\limits_{<v_j,v_i>\in E}\{d^{(k-1)}(j)+w_{ji}\} \\ j^{(k)}(i), & \text{反之} \end{cases}$$

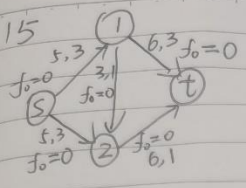
$1\le i\le n$, $1\le k\le n-1$

算法:

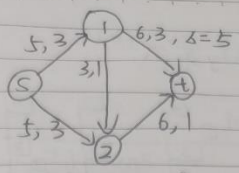
```
d(1)←1, h(1)←1
for i=2 to n do
    d(i)←+∞, h(i)←0
for k=1 to n-1 do
  for i=1 to n do
    for <vj,vi>∈E do
      if d(j)+wji<d(i) then
        d(i)←d(j)+wji, h(i)←j
return d,h
```

时间复杂度为 $O(n^3)$

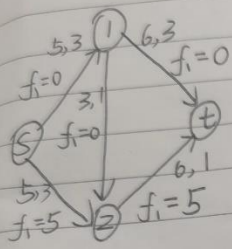
7.15



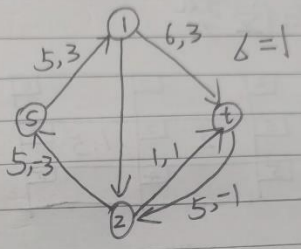
(a) f_0



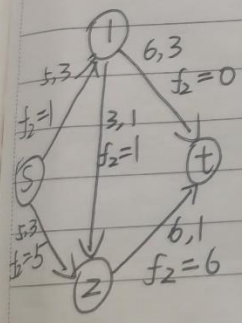
(b) $N(f_0)$



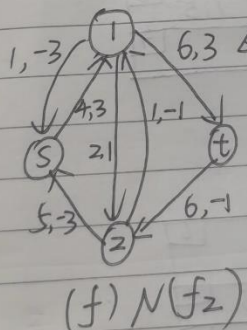
(c) f_1



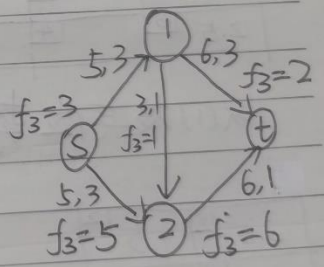
(d) $N(f_1)$



(e) f_2



(f) $N(f_2)$



(g) f_3

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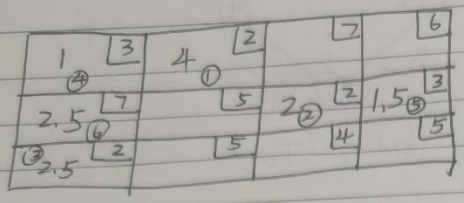
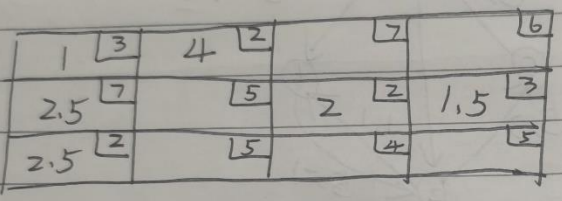
7.18

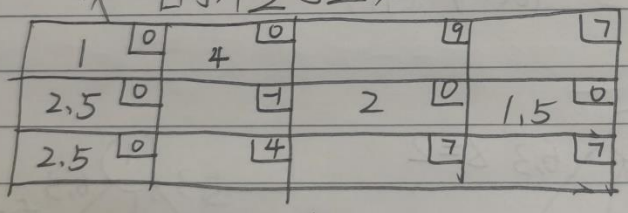
初始方案 $x^{(0)}$



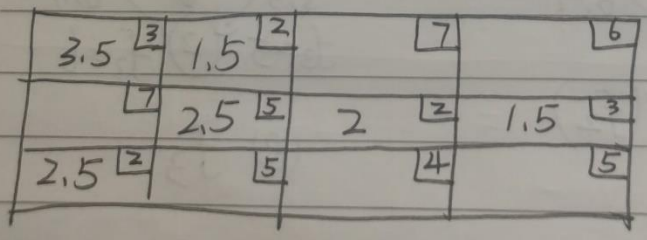
$x^{(0)}$ 的位势



$x^{(0)}$ 的检验数



$x^{(1)}$ 及其位势



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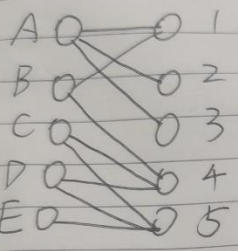
$x^{(1)}$的检验数

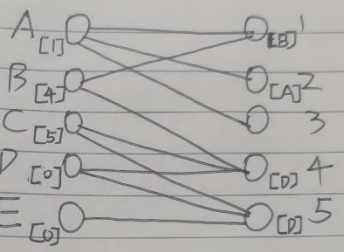
3.5 [0]	1.5 [0]	[8]	[6]
[1]	2.5 [0]	2 [0]	1.5 [0]
2.5 [0]	[4]	[6]	[6]

$x^{(1)}$为最优调运方案

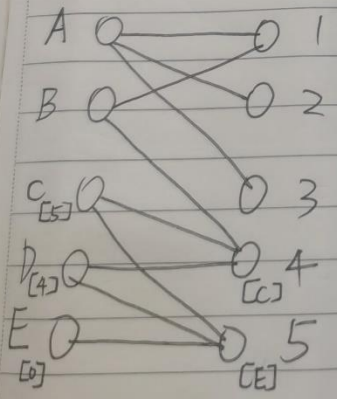
7.22



(a)



(b)



用匈牙利算法求解，前3个阶段易得$M_1=\{(A,1),(B,4),(C,5)\}$

增广交错路径为：$P=D4B1A2$

$M2=M1\oplus P=\{(A,2),(B,1),(C,5),(D,4)\}$

分配方案为：A → 2

B → 1

C → 5

D → 4，E 无岗位