<Transportation Problem>

Supply:

Demand:

Transportation Cost:

Transportation quantity:

min

s.t.

* Balanced problem: equations v.s. Unbalanced problem: inequalities

c.f. In balanced problem, the constraint matrix ***totally unimodular*** *(TU)*

1. Basic feasible solution
   1. North West Corner Rule: 980
   2. Minimum Cost Method: 960
   3. Penalty Cost (Vogel’s Approx): 920

Not always provide optimal solution,   
A가 빠르기는 하지만 좋은 solution을 주는 C가 선호  
degeneracy, **(m+n-1) positive values which are basic variables  
only m+n-1 linearly independent columns (rank(A)=m+n-1)**

1. Optimal Solution
   1. Stepping stone rule: basic feasible solution 유지 **(네모?)**, 체크
   2. **U-V modified Distribution: dual algorithm () (dual feasible check!)**

* 문제 사이즈 커지면, B가 선호

1. Other Issues
   1. When unbalanced problem   
      add dummy rows, columns, zero cost 🡺 balanced problem
   2. Assignment Problem (**degeneracy issues**, special case of balanced problem )