19-S1-Q1

Solution (a) ① balanced transportation problem Formula

② Min $Z = 20X_1 + 24X_2 + 24X_3 + 18X_4 + 23X_5 + 20X_6 + 20X_7 + 25X_8 + 26X_9$

Subject to

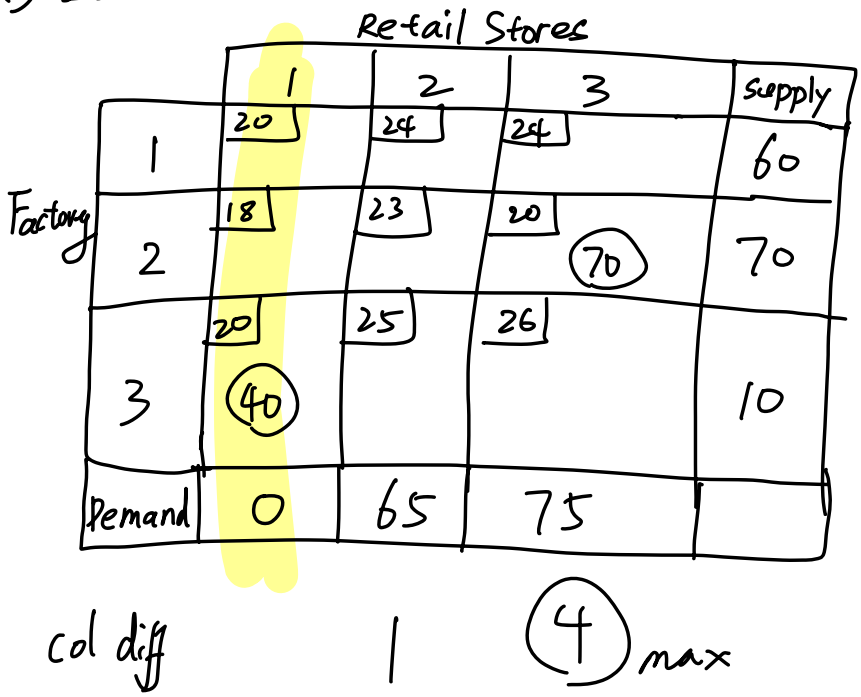
$$\begin{aligned} 20X_1 + 24X_2 + 24X_3 &= 60 \\ 18X_4 + 23X_5 + 20X_6 &= 70 \\ 20X_7 + 25X_8 + 26X_9 &= 50 \\ 20X_1 + 18X_4 + 20X_7 &= 40 \\ 24X_2 + 23X_5 + 25X_8 &= 65 \\ 24X_3 + 20X_6 + 26X_9 &= 75 \end{aligned}$$

$X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9 \geq 0$

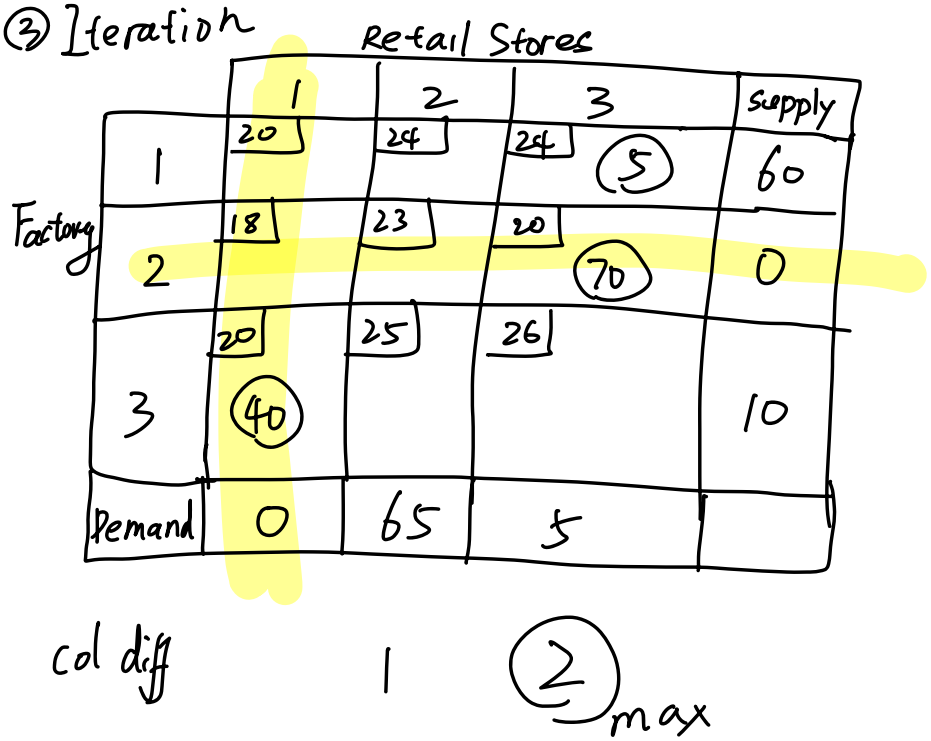
(b) ① Vogel approximation method

Factory \ Retail Stores	1	2	3	Supply	row diff
1	20	24	24	60	4
2	18	23	20	70	2
3	20 (40)	25	26	50	(5) max
Demand	40	65	75		
col diff	2	1	4		

② Iteration



③ Iteration



④ Iteration

Factory	Retail Stores 1	2	3	Supply
1	20	24 (55)	24 (5)	55
2	18	23	20 (70)	0
3	20 (40)	25 (10)	26	10
Demand	0	65	0	

⑤ test optimal : find the large number of basic element col. or row. and compute

$cost = u_i + v_i$

$cost - u_i - v_i$

Factory	Retail Stores 1	2	3	Supply	u_i
1	20 1	24 (55)	24 (5)	60	0
2	18 3	23 3	20 (70)	70	-4
3	20 (40)	25 (10)	26 1	50	1
Demand	40	65	75		
v_i	19	24	24		

⑥ Since all numbers of the table are nonegative the result is optimal

(c) System Analysis (PPT 上没有，应该不考)