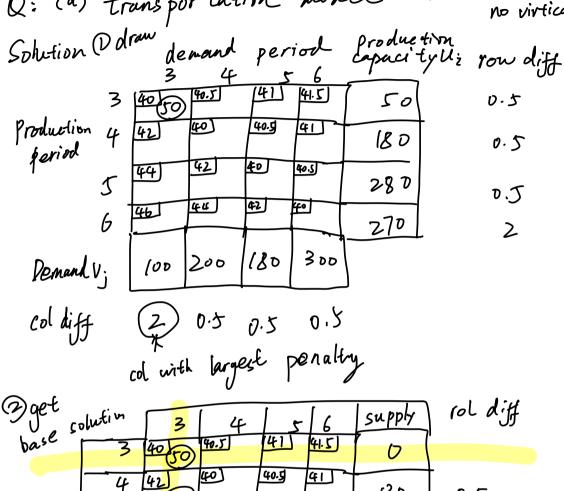
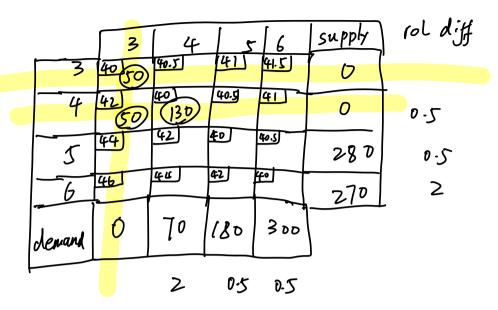
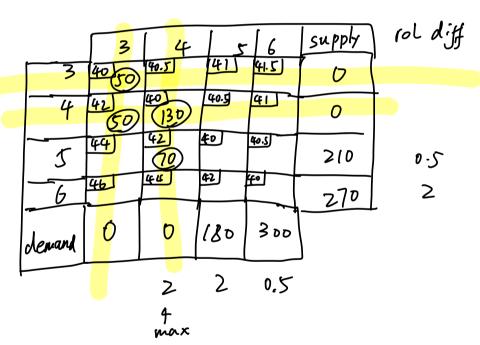
Q: (a) transportation model

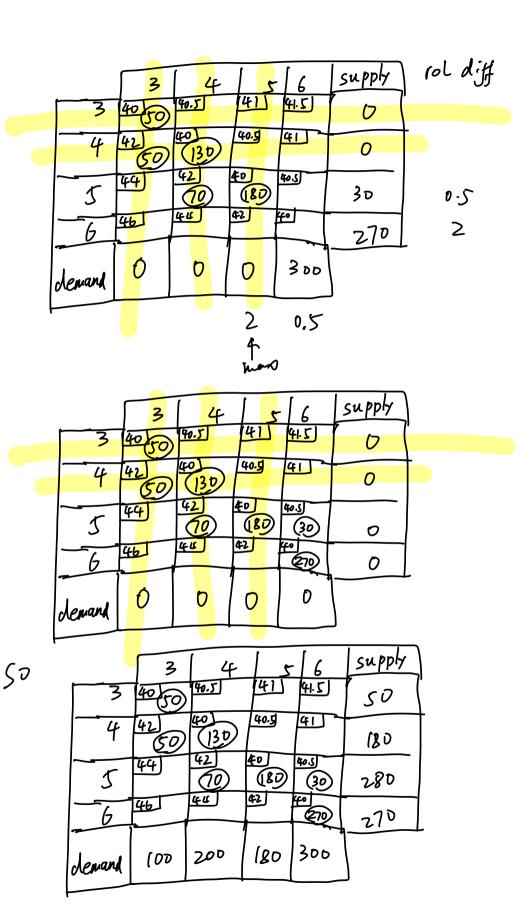
(on + 200 + 180 + 3 on = 780 no virtical supply



130 0.5 42 **40** 44 40.5 28 D 0.5 ५८ 42 40 46 2 270 300 180 200 demand 2 0.5 2 0.5 mark







3 fest optimal

<b>.</b> +	- april	3	1 4	1 0	-   6	supply	Wi
	3	4050	40.5	415	41.5) S	50	" -4
	4	42 50	(130)	40.g 2.5	2.5	(80	-2
	5	44) O	(10)	(80)	30	280	D
	6	46 2.5	7.7	2.5	#0 E70	270	-0-5
	demand	(O)	200	180	300		
-	Vi	44	42	40	40.5	-	

So, the solution is optimal

Cb) L?

Solution

$$0 = \pi_1^2 + x_2^2 + x_3^2 + \lambda_1(x_1 + x_2 + 3x_3 - 2) + \lambda_2(5x_1 + 2x_2 + x_3 - 5)$$

$$\frac{\partial L}{\partial x_1} = 2X_1 + \lambda_1 + J\lambda_2 = 0 \tag{1}$$

$$\frac{\partial L}{\partial x_2} = 2X_2 + \lambda_1 + 2\lambda_2 = 0 \qquad (2)$$

$$\frac{\partial L}{\partial x_3} = 2x_3 + 3\lambda_1 + \lambda_2 = 0 \qquad (3)$$

$$\frac{\partial L}{\partial \lambda_1} = \chi_1 + \chi_2 + 3\chi_3 - 2 = 0 \tag{4}$$

$$\frac{\partial L}{\partial \lambda_2} = \int X_1 + 2X_2 + X_3 - J = 0$$
 (5)

Solve the equation using 
$$\frac{casid}{casid}$$
 only  $\frac{4}{14}$   $\frac{1}{2}$   $\frac{1}{$ 

$$X = \begin{bmatrix} \frac{37}{46} & \frac{8}{23} & \frac{13}{46} \end{bmatrix}$$

$$Z = X_1^2 + X_2^2 + X_3^2 = \left(\frac{37}{46}\right)^2 + \left(\frac{8}{23}\right)^2 + \left(\frac{13}{46}\right)^2$$

$$= \frac{39}{46} = 0.8478$$

9 test optimal 
$$Dh_{i}(x) = [1 | 3]$$
 $Dh_{i}(x)Y = y_{1} + y_{2} + 3y_{3} = 0$ 

$$\frac{\partial^{2}L}{\partial x_{1}} = \frac{\partial L}{\partial x_{1}} = \frac{\partial L}{\partial x_{1}} = \frac{\partial L}{\partial x_{2}} = \frac{\partial L}{\partial x_{1}} = \frac{\partial L}{\partial x_{2}} = \frac{\partial L}{$$

$$\frac{\partial L}{\partial x_1} = 2X_1 + \lambda_1 + J\lambda_2 = 0 \qquad \frac{\partial L}{\partial x_1 \partial x_1} = 2$$

$$\frac{\partial L}{\partial x_2} = 2X_2 + \lambda_1 + 2\lambda_2 = 0 \qquad \frac{\partial L}{\partial x_2 \partial x_2} = 2$$

$$\frac{\partial L}{\partial x_3} = 2x_3 + 3\lambda_1 + \lambda_2 = 0 \quad \frac{\partial L}{\partial x_1 \lambda x_2} = 2$$

$$Y^{T} \nabla_{x}^{2} Y = [y, y_{2} y_{3}] \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix} \begin{bmatrix} y_{1} \\ y_{2} \end{bmatrix}$$

$$= [2y, 2y_{2} 2y_{3}] \begin{bmatrix} y_{1} \\ y_{2} \\ y_{2} \end{bmatrix}$$

$$= 2y_{1}^{2} + 2y_{2}^{2} + 2y_{3}^{2} > 0 \quad \forall y \neq 0$$

So 
$$X = \begin{bmatrix} \frac{37}{46} & \frac{8}{23} & \frac{13}{46} \end{bmatrix}$$
 is a minimum point

So 
$$X = \begin{bmatrix} \frac{37}{46} & \frac{8}{23} & \frac{13}{41} \end{bmatrix}$$
 is a minimum point  $Z = X_1^2 + X_2^2 + X_3^2 = \frac{39}{46} = 0.8478$  is the minimum value