

## Soluciones a los problemas de transporte y asignación

1. Tabla de transporte. El objetivo es minimizar.

	$D_1$	$D_2$	$D_3$	Oferta
$P_1$	100	100	50	15
$P_2$	650	110	100	15
$P_3$	60	65	75	15
$P_4$	150	90	70	15
Demanda	30	16	14	

2. Tabla de transporte. El objetivo es maximizar.

	$A_1$	$A_2$	$A_3$	Oferta
$C_1$	26	13	22	100
$C_2$	30	21	27	85
$C_3$	34	22	30	140
$C_4$	25	18	24	125
Demanda	125	150	175	

3. Tabla de transporte. El objetivo es maximizar.

	$C_1$	$C_2$	$C_3$	$C_4$	Oferta
$S_1$	60	40	45	55	130
$S_2$	70	55	65	60	200
$S_3$	80	60	55	75	170
$S_4$	$-M$	$-M$	0	0	50
Demanda	150	175	175	50	

4. Tabla de transporte. El objetivo es maximizar.

	semana 1	semana 2	semana 3	Oferta
Almacén	0	15	30	2
Semana 1, h. normal	20	35	50	5
Semana 1, h. extra	30	45	60	5
Semana 2, h. normal	$M$	30	45	4
Semana 2, h. extra	$M$	40	55	5
Semana 3, h. normal	$M$	$M$	45	2
Semana 3, h. extra	$M$	$M$	55	5
Demanda	8	8	8	

5. Soluciones factibles básicas iniciales.

5.1 Método de la esquina noroeste.

$$x_{11} = 300, x_{12} = 100, x_{22} = 200, x_{32} = 40, x_{33} = 400, x_{34} = 180, z = 14280.$$

Método de Vogel.

$$x_{14} = 400, x_{21} = 200, x_{31} = 100, x_{32} = 340, x_{33} = 140, x_{34} = 40, z = 11420.$$

5.2 Método de la esquina noroeste.

$$x_{11} = 10, x_{12} = 10, x_{13} = 10, x_{23} = 10, x_{24} = 20, x_{35} = 30, z = 3680.$$

La solución es degenerada.

Método de Vogel.

$$x_{14} = 10, x_{15} = 20, x_{21} = 10, x_{22} = 10, x_{33} = 20, x_{34} = 10, z = 2600.$$

5.3 Método de la esquina noroeste.

$$x_{11} = 80, x_{21} = 20, x_{22} = 80, x_{32} = 20, x_{33} = 50, x_{34} = 5, x_{44} = 45, x_{45} = 75, x_{55} = 25, x_{56} = 35, x_{66} = 65, z = 10585.$$

Método de Vogel.

$$x_{13} = 50, x_{16} = 30, x_{21} = 100, x_{35} = 75, x_{42} = 40, x_{45} = 10, x_{46} = 70, x_{52} = 60, x_{64} = 50, x_{65} = 15, z = 7300.$$

La solución es degenerada.

6. Soluciones óptimas.

6.1  $x_{11}^* = 32, x_{21}^* = 20, x_{22}^* = 3, x_{32}^* = 30, x_{41}^* = 18, x_{43}^* = 22, x_{44}^* = 7, z^* = 1931.$

6.2  $x_{11}^* = 20, x_{14}^* = 10, x_{23}^* = 10, x_{24}^* = 2, x_{32}^* = 4, x_{34}^* = 1, x_{44}^* = 10, z^* = 782.$

6.3 Soluciones óptimas múltiples.  $z^* = 174$ .

$$x_{11}^* = 3, x_{13}^* = 7, x_{24}^* = 3, x_{25}^* = 9, x_{31}^* = 1, x_{32}^* = 5, x_{34}^* = 6.$$

$$x_{12}^* = 3, x_{13}^* = 7, x_{24}^* = 3, x_{25}^* = 9, x_{31}^* = 4, x_{32}^* = 2, x_{34}^* = 6.$$

$$x_{11}^* = 4, x_{13}^* = 6, x_{23}^* = 1, x_{24}^* = 2, x_{25}^* = 9, x_{32}^* = 5, x_{34}^* = 7.$$

6.4 Soluciones óptimas múltiples.  $z^* = 199$ .

$$x_{15}^* = 4, x_{23}^* = 6, x_{31}^* = 3, x_{32}^* = 4, x_{33}^* = 1, x_{34}^* = 1.$$

$$x_{13}^* = 1, x_{15}^* = 3, x_{23}^* = 6, x_{31}^* = 3, x_{32}^* = 4, x_{34}^* = 2.$$

6.5 La solución óptima es degenerada.  $z^* = 3784$ .

$$x_{14}^* = 42, x_{22}^* = 40, x_{31}^* = 18, x_{32}^* = 10, x_{33}^* = 8, x_{35}^* = 12, x_{44}^* = 10.$$

6.6 La solución óptima es degenerada.  $z^* = 363$ .

$$x_{12}^* = 10, x_{13}^* = 5, x_{22}^* = 5, x_{31}^* = 9, x_{34}^* = 3, x_{44}^* = 2, x_{51}^* = 6.$$

7. Asignación óptima:  $P_1 \rightarrow D, P_2 \rightarrow C, P_3 \rightarrow A, P_4 \rightarrow B$ .  $P_5$  se queda sin trabajo.  $z^* = 25$ .

8. Dos asignaciones óptimas.  $z^* = 30$

$C_1 \rightarrow P_2, C_2 \rightarrow P_4, C_3 \rightarrow P_1, C_4 \rightarrow P_3$ .  $P_5$  se queda sin camión asignado.

$C_1 \rightarrow P_2, C_2 \rightarrow P_4, C_3 \rightarrow P_3, C_4 \rightarrow P_5$ .  $P_1$  se queda sin camión asignado.

9. Asignaciones óptimas.

9.1  $O_1 \rightarrow D_4, O_2 \rightarrow D_2, O_3 \rightarrow D_1, O_4 \rightarrow D_3, z^* = 27$ .

9.2  $O_1 \rightarrow D_2, O_2 \rightarrow D_4, O_3 \rightarrow D_5, O_4 \rightarrow D_1, O_5 \rightarrow D_3, z^* = 29$ .

9.3  $O_1 \rightarrow D_1, O_2 \rightarrow D_2, O_3 \rightarrow D_5, O_4 \rightarrow D_4, O_5 \rightarrow D_3, z^* = 55$ .