Quantitative Methods
Exercise 7

Name: Clarissa V. Dominguez

Solve the transportation problem below. Obtain the initial basic feasible solution using the Vogel's Approximation Method and determine if the solution is optimal using MODI-UV method.

		Destination			
		D1	D2	D3	Supply
	O1	8	5	7	5
Source	O2	6	4	3	3
	Demand	4	2	2	8 / 8

VOGEL'S APPROXIMATION METHOD SOLUTION:

COLUMN DIFFERENCE

		D1	D2	D3	Supply		
Source	O1	[3] ~~8~~	[2] ~~5~~	~~7~~	~~5~~ ~~3~~ 0	2	3
	O2	[1] ~~6~~	~~4~~	[2] ~~3~~	~~3~~ ~~1~~ 0	1	2
	Demand	~~4~~ ~~3~~ 0	~~2~~ 0	~~2~~ 0			
ROW DIFFERENCE		2	1	4			
		2	1	—			

COST – $(3\times 8)+(2\times 5)+(1\times 6)+(2\times 3)=\boxed{46}$

Phase 2: Modi - U.V Method

	$V_1 = 8$	$V_2 = 5$	$V_3 = 5$
$U_1 = 0$	$\boxed{3}$ 8	$\boxed{2}$ 5	7
$U_2 = -2$	$\boxed{1}$ 6	4	$\boxed{2}$ 3

$$\left.\begin{array}{l} n+m-1 = 2+3-1 = 4 \\ \text{no. of allocated cells} = 4 \end{array}\right\} \text{problem is not degenerate.}$$

for occupied cells:

$c_{ij} = U_i + V_j$

For unoccupied/unallocated cells:

$d_{ij} = c_{ij} - (U_i + V_j)$

$d_{13} = 7 - (0+5) = 2$

$d_{22} = 4 - (-2+5) = 1$

since $d_{ij} > 0$, we have an optimal solution

$\therefore$ the optimal transportation cost is equal to

$$(3\times8) + (2\times5) + (1\times6) + (2\times3) = \boxed{46}$$