Project 3

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**Problem 1:** Transshipment Model

Part A

i.

ii.

For this part we used Lindo. The input was as follows:

MIN 15 P1W1R1 + 16 P1W1R2 + 17 P1W1R3 + 20 P1W1R4 + 27 P1W2R3 + 23 P1W2R4 + 25 P1W2R5 + 29 P1W2R6 + 16 P2W1R1 + 17 P2W1R2 + 18 P2W1R3 + 21 P2W1R4 + 20 P2W2R3 + 16 P2W2R4 + 18 P2W2R5 + 22 P2W2R6 + 18 P3W1R1 + 19 P3W1R2 + 20 P3W1R3 + 23 P3W1R4 + 20 P3W2R3 + 16 P3W2R4 + 18 P3W2R5 + 22 P3W2R6 + 23 P3W3R4 + 21 P3W3R5 + 21 P3W3R6 + 15 P3W3R7 + 26 P4W2R3 + 22 P4W2R4 + 24 P4W2R5 + 28 P4W2R6 + 22 P4W3R4 + 20 P4W3R5 + 20 P4W3R6 + 14 P4W3R7

ST

! Supply Constraints

P1W1R1 + P1W1R2 + P1W1R3 + P1W1R4 + P1W2R3 + P1W2R4 + P1W2R5 + P1W2R6 <= 150

P2W1R1 + P2W1R2 + P2W1R3 + P2W1R4 + P2W2R3 + P2W2R4 + P2W2R5 + P2W2R6 <= 450

P3W1R1 + P3W1R2 + P3W1R3 + P3W1R4 + P3W2R3 + P3W2R4 + P3W2R5 + P3W2R6 + P3W3R4 + P3W3R5 + P3W3R6 + P3W3R7 <= 250

P4W2R3 + P4W2R4 + P4W2R5 + P4W2R6 + P4W3R4 + P4W3R5 + P4W3R6 + P4W3R7 <= 150

! Demand Constraints

P1W1R1 + P2W1R1 + P3W1R1 >= 100

P1W1R2 + P2W1R2 + P3W1R2 >= 150

P1W1R3 + P1W2R3 + P2W1R3 + P2W2R3 + P3W1R3 + P3W2R3 + P4W2R3 >= 100

P1W1R4 + P1W2R4 + P2W1R4 + P2W2R4 + P3W1R4 + P3W2R4 + P3W3R4 + P4W2R4 + P4W3R4 >= 200

P1W2R5 + P2W2R5 + P3W2R5 + P3W3R5 + P4W2R5 + P4W3R5 >= 200

P1W2R6 + P2W2R6 + P3W2R6 + P3W3R6 + P4W2R6 + P4W3R6 >= 150

P3W3R7 + P4W3R7 >= 100

END

And the results were:

LP OPTIMUM FOUND AT STEP 2

OBJECTIVE FUNCTION VALUE

1) 17100.00

VARIABLE VALUE REDUCED COST

P1W1R1 0.000000 210.000000

P1W1R2 50.000000 0.000000

P1W1R3 100.000000 0.000000

P1W1R4 0.000000 5.000000

P1W2R3 0.000000 10.000000

P1W2R4 0.000000 8.000000

P1W2R5 0.000000 8.000000

P1W2R6 0.000000 9.000000

P2W1R1 100.000000 0.000000

P2W1R2 100.000000 0.000000

P2W1R3 0.000000 0.000000

P2W1R4 0.000000 5.000000

P2W2R3 0.000000 2.000000

P2W2R4 50.000000 0.000000

P2W2R5 200.000000 0.000000

P2W2R6 0.000000 1.000000

P3W1R1 0.000000 2.000000

P3W1R2 0.000000 2.000000

P3W1R3 0.000000 2.000000

P3W1R4 0.000000 7.000000

P3W2R3 0.000000 2.000000

P3W2R4 150.000000 0.000000

P3W2R5 0.000000 0.000000

P3W2R6 0.000000 1.000000

P3W3R4 0.000000 7.000000

P3W3R5 0.000000 3.000000

P3W3R6 100.000000 0.000000

P3W3R7 0.000000 0.000000

P4W2R3 0.000000 9.000000

P4W2R4 0.000000 7.000000

P4W2R5 0.000000 7.000000

P4W2R6 0.000000 8.000000

P4W3R4 0.000000 7.000000

P4W3R5 0.000000 3.000000

P4W3R6 50.000000 0.000000

P4W3R7 100.000000 0.000000

iii.

According to Lindo, you would want to do the following:

P1W1R2 50.000000 (ship 50 refrigerators from P1 to R1 through W1)

P1W1R3 100.000000 (ship 100 refrigerators from P1 to R3 through W1)

P2W1R1 100.000000 (ship 100 refrigerators from P2 to R1 through W1)

P2W1R2 100.000000 (ship 100 refrigerators from P2 to R2 through W1)

P2W2R4 50.000000 (ship 50 refrigerators from P2 to R4 through W2)

P2W2R5 200.000000 (ship 200 refrigerators from P2 to R5 through W2)

P3W2R4 150.000000 (ship 150 refrigerators from P3 to R4 through W2)

P3W3R6 100.000000 (ship 100 refrigerators from P3 to R6 through W3)

P4W3R6 50.000000 (ship 50 refrigerators from P4 to R6 through W3)

P4W3R7 100.000000 (ship 100 refrigerators from P4 to R7 through W3)

Part B

Part C

Part D

**Problem 2:** A mixture problem

**Problem 3:** Solving shortest path problems using linear programming.