Unit 6 : Week 6 - Quiz 6

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1. Transportation and assignment problems are really linear programming techniques called network flow problems (Points : 1)

- ○ True
- ○ False

2. Transportation models may be used when a firm is trying to decide to manufacture a new product line. (Points : 1)

- ○ True
- ○ False

3. The objective of a transportation problem solution is to schedule shipments from sources to destinations while minimizing total transportation and production costs. (Points : 1)

- ○ True
- ○ False

4. In a transportation problem, each destination must be supplied by one and only one source. (Points : 1)

- ○ True
- ○ False

5. In a balanced transportation problem, the total demand equals the total supply. (Points : 1)

- ○ True
- ○ False

6. If a transportation problem has 5 sources and 4 destinations, the linear program for this situation will have 20 variables and 9 constraints.
(Points : 1)

- ○ True
- ○ False

7. An assignment problem may be viewed as a transportation problem with only demand constraints? (Points : 1)

- ○ True
- ○ False

8. A dummy destination and a dummy source must be added if the total demand is greater than the total capacity in a transportation problem. (Points : 1)

- ○ True

○ False

9. The objective of an assignment problem solution most often is to minimize the total costs or time of performing the assigned tasks. (Points : 1)

○ True
○ False

10. The transportation problem can only be used to solve minimization problems. (Points : 1)

○ True
○ False

11.

	To ⟹	1	2	3	Supply
From	A	3: 20	6: 20	4:	40
	B	3:	4: 30	5:	30
	C	5:	7: 20	6: 10	30
	Demand	20	70	10	

What is the total cost represented by the solution shown in the table above?

A) 60

B) 2500

C) 2600

D) 500

E) Cannot be determined with the given information

(Points : 1)

○ A
○ B
○ C
○ D
○ E

12.

Both transportation and assignment problems are members of a category of Linear Programming techniques called _____.

A) transshipment problems

B) Hungarian problems

C) source-destination problems

D) supply and demand problems

E) network flow problems

(Points : 1)

- ○ A
- ○ B
- ○ C
- ○ D
- ○ E

13.

Transportation models can be used for which of the following decisions?

A) facility location

B) production mix

C) media selection

D) portfolio selection

E) employee shift scheduling

F) all of the above

G) none of the above

(Points : 1)

- ○ A
- ○ B
- ○ C
- ○ D

○ E

○ F

○ G

14.

Which of the following statements concerning the transshipment problem are false?

A) The number of units shipped into a transshipment point should be equal to the number of units shipped out.

B) There can be constraints on the number of units shipped out of an origin point.

C) There can be constraints on the number of units shipped into a destination point.

D) The transshipment problem can be solved with linear programming.

E) Any units shipped from one origin point must all go to the same destination point.

F) All are false

(Points : 1)

○ A

○ B

○ C

○ D

○ E

○ F

15.

The two most common objectives for the assignment problem are the minimization of _____.

A) uncertainty or inexperience

B) total costs or inexperience

C) total costs or total time

D) total time or inexperience

E) total costs or uncertainty

(Points : 1)

- ○ A
- ○ B
- ○ C
- ○ D
- ○ E

16.

Which of the following statements concerning transportation and assignment models is false?

A) The transportation, transshipment, and assignment problems can all be solved using linear programming.

B) A common objective is cost minimization.

C) Both transportation and assignment models involve the distribution of goods from sources to destinations.

D) The assignment problem can have a maximization objective.

E) The transshipment problem is a special class of transportation problems.

(Points : 1)

- ○ A
- ○ B
- ○ C
- ○ D
- ○ E

17.

What is the overall objective in applying the transportation method to the facility location problem?

A) minimize the distance traveled

B) minimize the number of items shipped

C) maximize the value of items shipped

D) minimize the cost of the distribution system

E) None of the above

(Points : 1)

- ○ A
- ○ B
- ○ C
- ○ D
- ○ E

18.

In a transshipment problem involving 3 origins, 2 intermediate points, and 4 final destinations, what is the maximum number of decision variables?

A) 24

B) 9

C) 14

D) 7

E) 20

F) Cannot be determined with the given information
(Points : 1)

- ○ A
- ○ B
- ○ C
- ○ D
- ○ E
- ○ F

19. Select all that apply:

A transportation problem

(Points : 6)

- ☐ may give an initial feasible solution rather than the optimal solution.
- ☐ requires the same assumptions that are required for linear programming problems.
- ☐ can only be used for supply and demand problems.
- ☐ is a special case of the linear programming problem.
- ☐ is a network flow problem
- ☐ can be solved by linear programming, but is solved more efficiently by a special-purpose algorithm.

20. Susan must assign four different instructors to four different training sites. The profit (in hundreds of dollars) associated with each instructor at each training site is presented below. Susan would like to assign the various instructors so that the total profit is maximized. Find the appropriate assignments and the Total Profit. **(Place only the correct number corresponding to the answer in the box)**

Operators	Location			
	Hampton	Suffolk	Norfolk	Smithfield
Lakeshia	9	11	7	10
Connie	10	12	6	12
Lamaar	8	10	13	9
Shanta	12	8	11	10

(Points : 5)

Potential Matches:

1 : Hampton
2 : $4100
3 : $4400
4 : Smithfield
5 : Williamsburg
6 : Newport News
7 : $3200
8 : Norfolk
9 : $4800
10 : Suffolk

Answer

[ ] : Lakeshia
[ ] : Connie
[ ] : Lamaar
[ ] : Shanta

[ ] : Total Cost =

21.

	Job (Time in Minutes)			
	Job 1	Job 2	Job 3	Job 4
Chris	5	9	5	7
Tory	3	8	4	4
Ron	5	5	8	4
Betty	7	4	5	5

George's company must assign workers to each of four jobs. The time involved varies according to individual abilities. The table above shows how many minutes it takes each worker to perform each job. If the optimal assignments are made, how many total minutes would be required for completing the jobs? _____minutes. (express answer as a numeric value only; eg. 22)

(Points : 2)

22. Is the transportation model an example of decision making under certainty or decision making under uncertainty? Explain your answer. (Points : 4)

Spellchecker

23. Explain how to determine the number of variables and constraints that would be in a transportation problem simply by knowing the number of sources and the number of destinations. (Points : 4)

Spellchecker

24. BONUS: 5 Points

Dobbs Appliances manufacturers refrigerators in Richmond, Charlotte, and Atlanta. Refrigerators then must be shipped to meet demand in Washington, New York, and Miami. The table below lists the shipping costs, supply, and demand information.

	To: Washington	To: New York	To: Miami	**Supply**
From: Richmond	$10	$20	$30	**100**
From: Charlotte	$15	$25	$20	**1500**
From: Atlanta	$20	$20	$10	**2000**
Demand	**1000**	**1800**	**1200**	

How many units should be shipped from each plant to each retail store in order to minimize shipping costs?

Spellchecker

25. BONUS: 8 Points

Niketa Sports Company manufacturers treadmills in factories located in Pittsburgh and Kansas City. These are shipped to regional distribution centers in Chicago, Phoenix, and Philadelphia. Ultimately they are delivered to

supply houses in New York and Los Angeles. The available supplies at the factories, demands at the final destinations, and shipping costs are illustrated in the table below.

	To: Chicago	To: Phoenix	To: Philadelphia	To: New York	To: Los Angles	Supply
From: Pittsburgh	$4	$8	$2	--	--	1500
From: Kansas City	$3	$6	$5	--	--	1000
From: Chicago	--	--	--	$5	$7	--
From: Phoenix	--	--	--	$8	$3	--
From: Philadelphia	--	--	--	$2	$9	--
Demand	--	--	--	1200	800	--

Part 1. Formulate this problem as a linear program.

Let (1) = Pittsburgh, (2) = Kansas City, (3) = Chicago, (4) = Phoenix, (5) = Philadelphia, (6) = New York, and (7) = Los Angeles

Let x_{ij} = the number of units shipped from location i to location j.

Part 2.
Determine how many units should be shipped for all possible origin and destination points (final or intermediate) in the distribution network in order to minimize shipping costs

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