Lesson 11 Location Planning & Analysis Solutions

Solved Problem #1: see text book

Solved Problem #2: see textbook

Solved Problem #3: see textbook

Solved Problem #4: see textbook

#1: A newly formed company must decide on a plant location. There are two alternatives under consideration: locate near the major raw materials (Omaha) or locate near the major customers (Kansas City). Locating near the raw materials will result in lower fixed and variable costs than locating near the market, but the owners believe there would be a loss in sales volume because customers tend to favor local suppliers. Revenue per unit will be $185 in either case. The cost information is:

	Fixed Costs	Variable Cost per unit	Expected Annual Demand
Omaha	$1.2 million	$36	8,000
Kansas City	$1.4 million	$47	12,000

Answer the following questions. This problem can be done using a template; however, you may find that it is quicker to do it manually.

a. What is the profit if the company decides to locate in Omaha? Kansas City?

Omaha – 185*8000-(1,200,000+36*8000) = -$8,000
Kansas City – 185*12,000-(1,400,000+47*12,000) = $256,000

b. Which location should the company build its new plant?

Kansas City

#2: The owner of Genuine Subs, Inc., hopes to expand the present operation by adding one new outlet. She has studied three locations. Each would have the same labor and materials costs (food, serving containers, napkins, etc.) of $1.76 per sandwich. Sandwiches sell for $2.65 each in all locations. Rent and equipment costs would be $5,000 per month for location A, $5,500 per month for location B, and $5,800 per month for location C.

Answer the following questions.

a. Determine the monthly volume necessary at each location to realize a monthly profit of $10,000. Hint: you may do this problem manually for each location or recognize that the break even analysis template from a previous lesson will provide the answers very quickly.

Location A – 16,583.9326 rounded to 16,584 sandwiches
Location B – 17,415.7303 rounded to 17416 sandwiches
Location C – 17,752.8090 rounded to 17,753 sandwiches

b. If the monthly expected sales volume at A, B, and C is 21,000, 22,000, and 23,000, respectively, determine the profits at each location. Hint: same as a.

Location A – $13,690
Location B – $14,080
Location C – $14,670

#3: A small producer of machine tools wants to move to a larger building, and has identified two alternatives: Location A has annual fixed costs of $800,000 and variable costs of $14,000 per unit; location B has annual fixed costs of $920,000 and variable costs of $13,000 per unit. Finished items sell for $17,000 each.

Answer the following questions.

    a.   Display the cost/volume relationship for the two alternatives on the same graph.
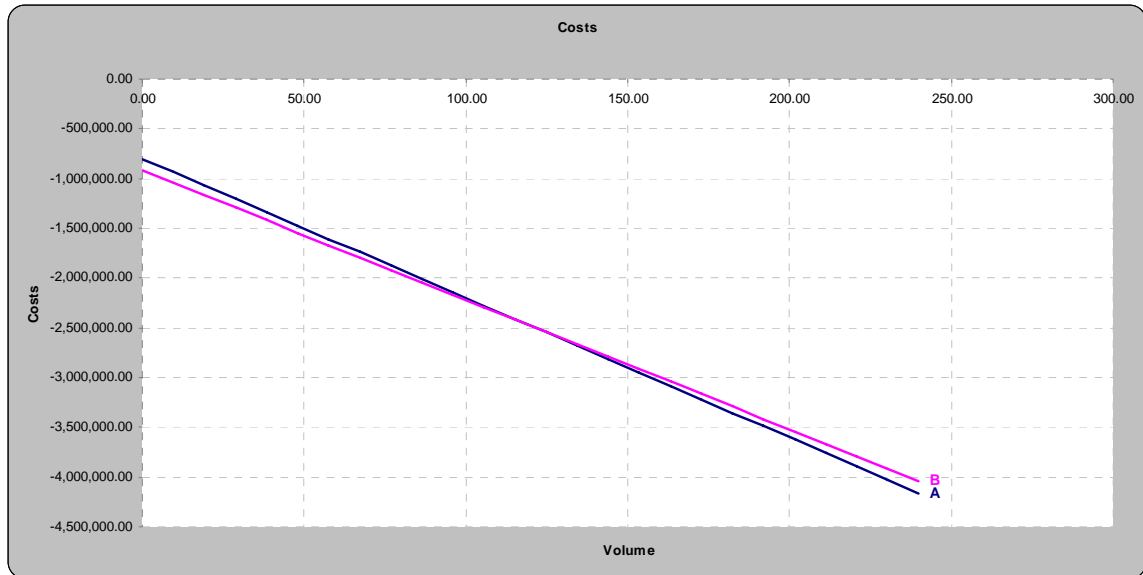
   b.   At what volume do the two alternatives have the same cost? What is the cost at the point of indifference?

120 units
Cost at point of indifference is $2,480,000

		Costs Information	
Pair		**Intersection**	**Costs $**
A	**B**	**120**	**-2480000**

    c.   For what range of volume does location A have the lowest cost? Location B?

Location A has lowest cost when 0 <= Volume < 120 units
Location B has lowest cost when Volume > 120 units

    d.   Using the revenue per unit, display the profit/volume relationship on the same graph.
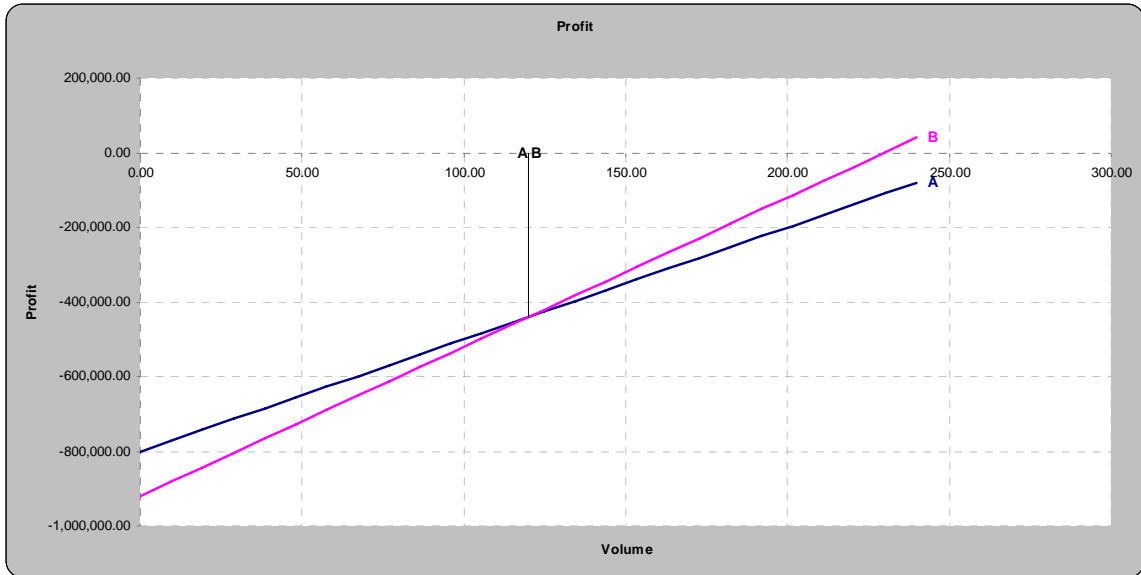
e. What is the profit for each alternative at the point of at the point of indifference?

Profit is -$440,000

f. Assume the volume is 250 units. What is the total cost for location A? Location B?

Cost at location A is $4,300,000
Cost at location B is $4,170,000

Volume Analysis	
Volume	250
Revenue/Unit	17000
Total Costs	Profit
-4300000	-50000
-4170000	80000

g. Assume the volume is 250 units. What is the profit for location A? Location B?

Profit at location A is -$50,000
Profit at location B is $80,000

h. What is the break even volume for location A? Location B?

Break even volume for location A is 266.66… rounded to 267 units
Break even volume for location B is 230 units

	Cost Information					Volume Analysis	
-Alternative-	Fixed Cost	VC/Unit	Trans Cost	Break Even		Volume	
						Revenue/Unit	17000
A	800,000	14,000		266.666667		Total Costs	Profit
B	920,000	13,000		230			

3

#4: A company that produces pleasure boats has decided to expand one of its lines. Current facilities are insufficient to handle the increased workload, so they are considering 3 alternatives: New location, Subcontract, and Expand existing facilities.

The New location would involve substantial fixed costs but relatively low variable costs: fixed costs would be $250,000 per year, and variable costs would be $500 per boat.

Subcontracting would involve a cost per boat of $2,500.

Expansion would require an annual fixed cost of $50,000 and a variable cost of $1,000 per boat.

Answer the following questions.

    a. Display the cost/volume relationship of the three alternatives on the same graph.
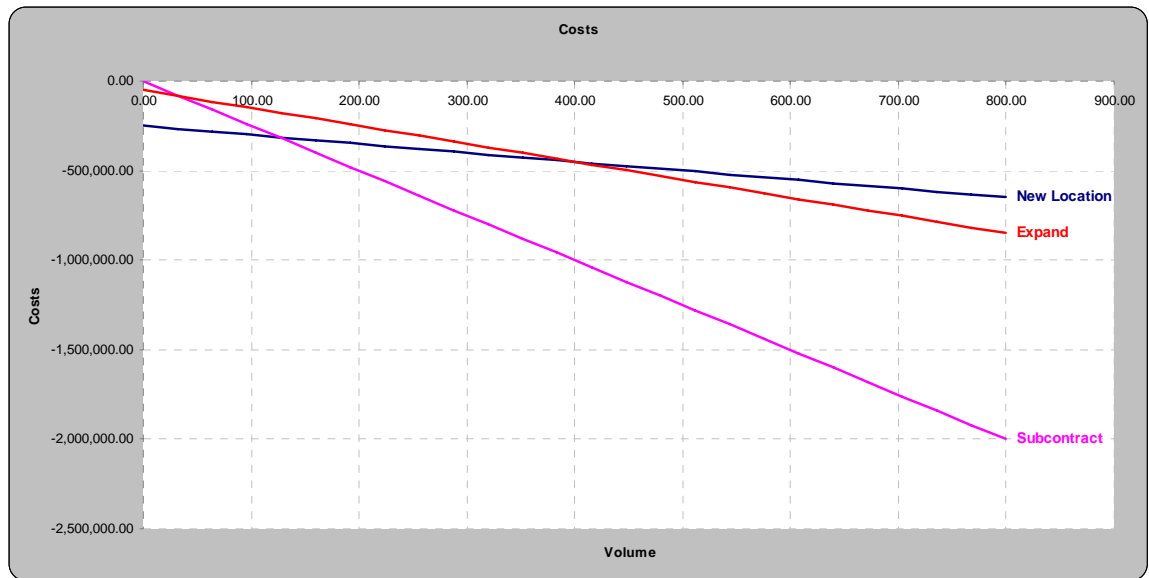
    b. Over what range of volume does each alternative have the lowest total cost?

Subcontract has lowest total cost when Volume < 33.33… boats
Expand has the lowest total cost when 33.333 … < Volume < 400 boats
New Location has the lowest total cost when Volume > 400 boats

    c. What is the point of indifference between Expansion and New Location? What is the cost for Expansion and New Location at the point of indifference?

Point of indifference is 400 boats
Cost for Expansion and New Location is the same ($450,000) at the point of indifference

    d. Use the graph in a. to determine the alternative the alternative that be chosen to yield the lowest total cost for a volume of 150 boats? What is the total cost at this volume?
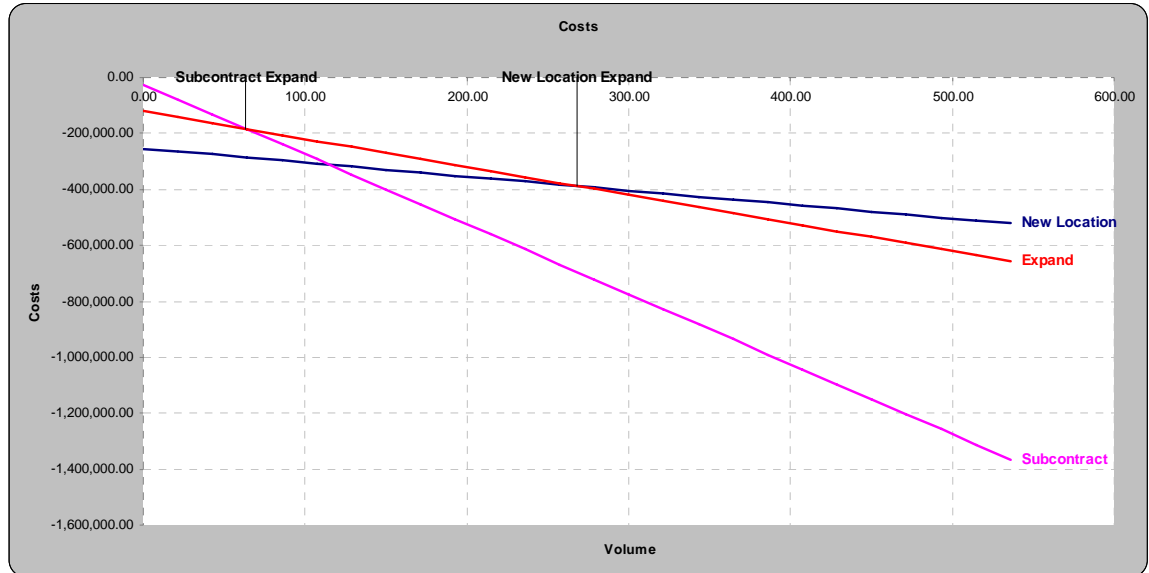
Expand has the lowest total cost of $200,000

    e. Aside from costs, what are some of the other factors that should be considered between Subcontracting and Expansion?

f. Use the following additional information: transportation cost will increase by the amounts listed below.

Expansion:	$70,000
Subcontracting:	$25,000
New Location:	$4,000

   i. Display the cost/volume relationship of the three alternatives on the same graph.

   ii. Over what range of volume does each alternative have the lowest total cost?

Subcontract has lowest total cost when Volume < 63.33… boats
Expand has the lowest total cost when 63.333 … < Volume < 268 boats
New Location has the lowest total cost when Volume > 268 boats

   iii. What is the point of indifference between Expansion and New Location? What is the cost of each at the point of indifference?

Point of indifference is 268 boats
Cost for Expansion and New Location is the same ($388,000) at the point of indifference

#5: Use the following subjective factor ratings.

		Location		
Factor	Weight	A	B	C
Convenience	0.15	80	70	60
Parking facilities	0.20	72	76	92
Display area	0.18	88	90	90
Shopper traffic	0.27	94	86	80
Operating costs	0.10	98	90	82
Neighborhood	0.10	96	85	75
	1.00			

Answer the following questions.

a.   What is the subjective weighted composite score for each location?

A – 87.02
B – 82.62
C – 80.90

b.   Based on the subjective weighted composite score which location should be chosen?

A

#6: A manager has received an analysis of several cities being considered for a new office complex.

	Location		
Factor	Atlanta	Boston	Chicago
Business services	9	5	5
Community services	7	6	7
Real estate cost	3	8	7
Construction costs	5	6	5
Cost of living	4	7	8
Taxes	5	5	4
Transportation	6	7	8

Answer the following questions.

a.   If the manager weights the factors equally, what is the subjective weighted composite score for each location? Based on the results, which location decision would the manager make? Hint: there are 7 factors making the weight for each =1/7.

Atlanta – 5.5714
Boston – 6.2857
Chicago – 6.2857

Boston and Chicago are the best and have the same composite score.

b.   If business services and construction costs are given weights that are double the weights of the other factors, what is the subjective weighted composite score for each location? Based on the

results, which location decision would the manage make? Hint: Consider 9 factors with the weights for business services and construction costs =2/9 each. The others will have a weight of =1/9.

**Atlanta –5.8888….**
Boston – 6.1111….
Chicago – 6

Boston would be chosen.

#7: A toy manufacturer produces toys in five locations throughout the country. Raw materials (primarily barrels of powdered plastic) will be shipped from a new, centralized warehouse whose location is to be determined. The monthly quantities to be shipped to each location are the same. A coordinate system has been established, and the coordinates of each location have been determined as shown.

Location	X	Y
A	3	7
B	8	2
C	4	6
D	4	1
E	6	4

a. Display a graph showing the manufacturing locations and the optimal location of the new centralized warehouse.
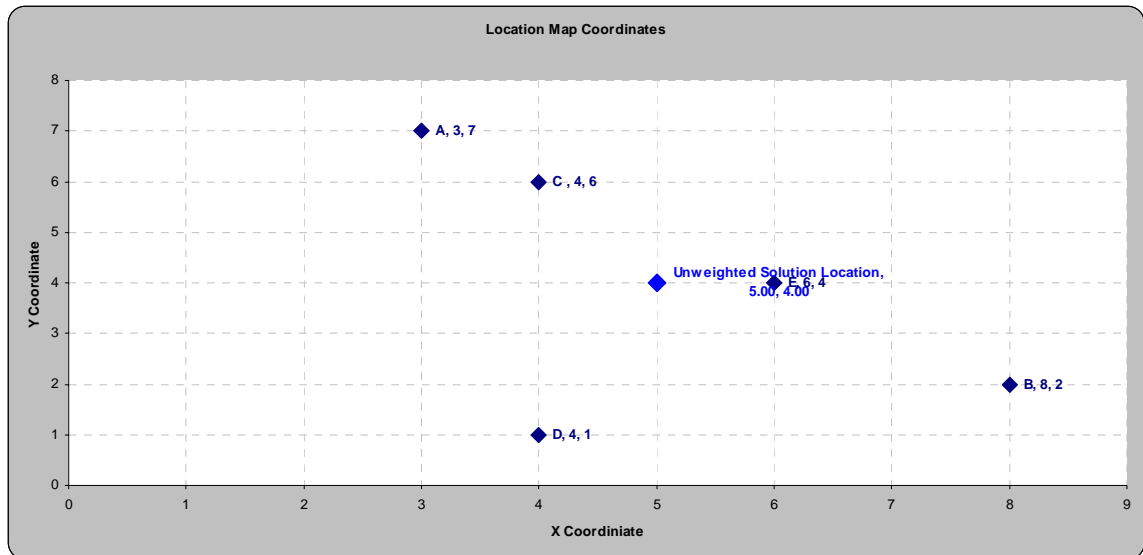
b. What are the coordinates where the new warehouse should be located?

X = 5.00, Y = 4.00

#8: A clothing manufacturer produces women's clothes at four locations in Mexico. A grid, showing relative locations has been develop and is shown below. The location of a central shipping point for bolts of cloth must now be determined. Weekly quantities to be shipped to each manufacturing location from the central shipping point are also shown.

Location	X	Y	Weekly Quantity
A	5	7	15
B	6	9	20
C	3	9	25
D	9	4	30

a. Display a graph showing the manufacturing locations and the optimal location of the new centralized warehouse.

b. What are the coordinates where the new warehouse should be located?

X = 6.00, Y = 7.00

#9: A company that has recently experienced enormous growth is seeking to lease a small plant in Memphis, Tenn.; Biloxi, Miss.; or Birmingham, Ala. Fixed, variable and transportation costs for each location are:

	Fixed Costs	Variable Cost/Unit	Transportation Costs
Memphis	40,000	8	50,000
Biloxi	60,000	4	60,000
Birmingham	100,000	5	25,000

Prepare an economic analysis of the three alternatives by answering the following questions.

a. Display the cost/volume relationship of the three alternatives on the same graph.
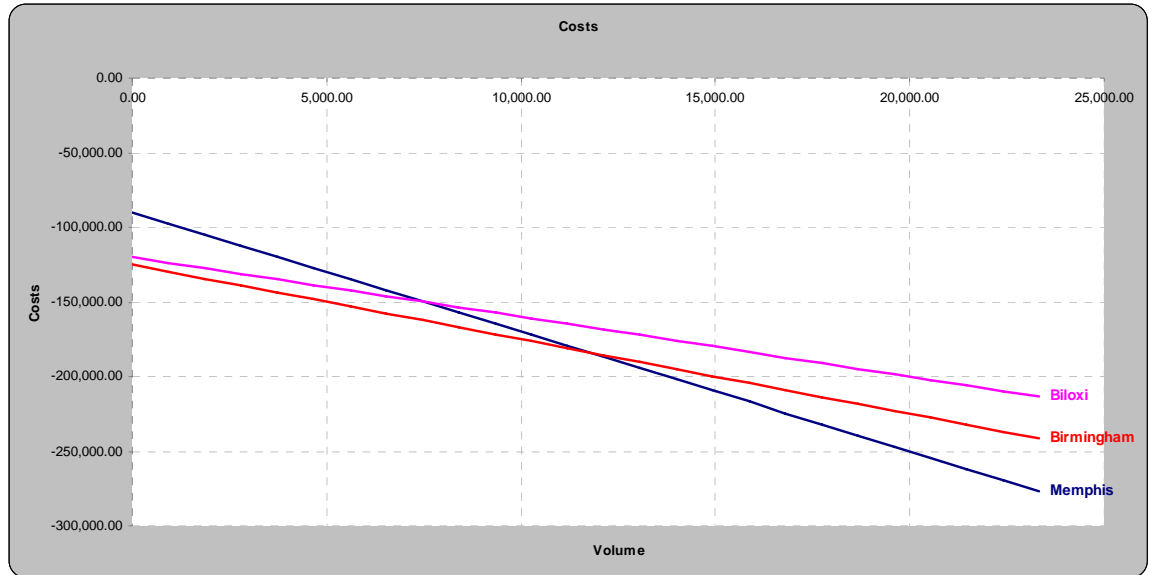
b. Over what range of volume does each alternative have the lowest total cost?

Memphis has lowest total cost when Volume < 7,500 units
Biloxi has the lowest total cost when Volume > 7,500 units
Birmingham never has the lowest total cost

c. What is the point of indifference between Memphis and Biloxi? What is the cost for Memphis and Biloxi at the point of indifference?

Point of indifference is 7,500 units
Cost for Memphis and Biloxi is the same ($150,000) at the point of indifference

d. Use the graph in a. to determine the alternative the alternative that be chosen to yield the lowest total cost for a volume of 10,000 units? What is the total cost at this volume?

Biloxi has the lowest total cost of $160,000