Northern Borders University	IE 453 Facilities Planning
Faculty of Engineering	Final Exam Dr. Mohamed Mostafa
IE Department	Date: 4/8/1435 Time Allowed: 2 Hrs

Solve the following Problems (Open Notes Exam)

Problem # 1 (15 Points)

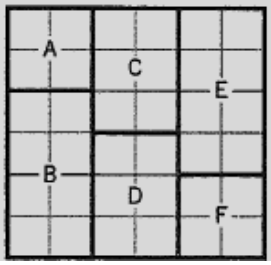
Suppose the following layout is provided as the initial layout to CRAFT. The flow-between matrix and the distance matrix are given as follows.

Flow-Between Matrix

	A	B	C	D	E	F
A	—	0	8	0	4	0
B		—	0	5	0	2
C			—	0	1	0
D				—	6	0
E					—	4
F						—

Distance Matrix

	A	B	C	D	E	F
A	—	30	25	55	50	80
B		—	45	25	60	50
C			—	30	25	55
D				—	45	25
E					—	30
F						—



Unit Cost Matrix

	A	B	C	D	E	F
A	-	2	1	3	1	2
B	2	-	1	2	3	1
C	1	1	-	2	1	2
D	3	2	2	-	2	3
E	1	3	1	2	-	1
F	2	1	2	3	1	-

a. Given the above data and initial layout, which pairs will be considered for exchange.
b. Compute the cost of the initial layout.
c. Compute the *estimated* layout cost assuming that departments A and B are exchanged.
d. Compute the *actual* layout cost assuming that departments E and F are exchanged.

Problem # 2 (10 Points)

For the machine-part matrix for a local wooden manufacturer shown below, form cells using the direct clustering algorithm and, if conflicts exist, propose alternative approaches for resolving the conflicts.

	Machine #					
Part #	1	2	3	4	5	6
1					1	1
2	1			1		
3			1			1
4	1	1				
5	1					
6					1	1
7		1		1		
8			1			1

Problem # 3 **(15 Points)**

Naif plans to rent building space for a new print shop within the city limits. The location for current distribution centers, expected deliveries, and possible locations for the facility are shown in the tables and figures below:

a. Determine the optimal location for the new print shop.
b. Rank the alternative locations in order of preference.
c. Solve part (a) using squared Euclidean diastances.

Current distribution centers:

Center	x-Coordinate	y-Coordinate	Weight
A	5	10	200
B	50	15	400
C	25	25	500
D	35	5	300
E	15	20	400
F	30	30	600

Possible locations for the new print shop:

Building	x-Coordinate	y-Coordinate
1	20	20
2	40	25
3	25	35

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