Study questions on Layout and Line balancing

1.

A manufacturer is evaluating their machine shop's current process layout. The figure below shows the current layout, and the table shows the trip matrix for their facility. Safety and health regulations require departments E and F to remain at their current locations.

Current layout

E	B	F
A	C	D

Trips between departments

Dept.	A	B	C	D	E	F
A	-	8	3	-	9	5
B	-	-	-	3	-	-
C			-	-	8	9
D				-	-	3
E					-	3
F						-

a) Use trial and error to find a better layout

b) How much better is your layout than the current one, in terms of the ld-score? (*Use rectilinear distance*)

2.

Compare the Process layout and the Product layout with respect to their advantages and disadvantages.

3.

A subassembly line involves 13 work elements and must handle 20 cars per hour. In addition to the usual precedence constraints, there are two zoning constraints. First, work elements K and L should be assigned to the same station, both use a common component, and assigning them to the same station conserves storage space. Second, work elements H and J cannot be performed at the same station. Work element data is shown in the table below.

Work element	Time (minutes)	Immediate Predecessor(s)
A	1.8	None
B	0.4	None
C	1.6	None
D	1.5	A
E	0.7	A
F	0.5	E
G	0.8	B
H	1.4	C
I	1.4	D
J	1.4	F, G
K	0.5	H
L	1.0	J
M	0.8	I, K, L

a) Draw a precedence diagram.
b) What cycle time (in minutes) results in the desired output rate?
c) What is the theoretical minimum number of work stations?
d) Balance the line as best as you can.
e) What is the efficiency of your solution?

Other excersises can be found in the old exams:

2011-06-09: Q11,

2012-01-12: Q1