

Homework 3

- Due Nov 6 by 11:59pm
- Points 40
- Submitting a text entry box or a file upload
- Available Oct 24 at 12am - Nov 6 at 11:59pm

This assignment was locked Nov 6 at 11:59pm.

Please complete the problems using Excel, answer the questions asked in Word, then submit both files.

Ranlux Power (<https://canvas.asu.edu/courses/194159/files/89304502?wrap=1>) 

(https://canvas.asu.edu/courses/194159/files/89304502/download?download_frd=1) is a producer of micro, personal, residential, and industrial air conditioning units. Over the coming month, Ranlux wants assistance in determining how many of each product type they should produce to maximize their profits. Ranlux' air conditioners have to go through 5 industrial processes in order: stamping, welding, chemical injection, assembly, and inspection. Additionally, there are storage limits as all of the produced items must be stored in the warehouse at the same time and there are minimum and maximum sale requirements. The following tables contains all of the relevant data for each air conditioning type including the amount of time required in each department (in hours), the storage requirement (in ft²), and the profit per unit.

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Air Conditioners	Stamping	Welding	Chem. Injection	Assembly	Inspection	Storage Space
Micro	1.1	1.3	2.1	2.4	1.4	4.8
Personal	2.5	3.2	2.8	2.6	2.1	9.6
Residential	4	3.6	3.3	3.5	3.1	11.8
Industrial	4.4	4.1	4.8	4.9	4.1	13.4
Limits	8000	8000	8000	8000	8000	30000

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Air Conditioners	Min Sales	Max Sales	Profit
Micro	0	500	910

Personal	0	750	1310
Residential	100	1000	1810
Industrial	100	1500	2210

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Ranlux wants to determine how many of each air conditioning units should be manufactured given all of the limitations such that they achieve the maximum possible profit. Develop, implement, and solve the linear optimization problem in Excel to determine the optimal production plan (do not require your variables to be integers!)

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Once the model is solved, answer the following questions:

(<https://canvas.asu.edu/courses/194159/files/89303967/download?wrap=1>)

1. What is the monthly profit and monthly production for each air conditioner type?
2. Run the sensitivity report. Which constraints are binding?
3. Only using the sensitivity report (do not change the value and re-run the model), would the optimal production plan change if the profit for each Micro air conditioner change to 1000? If your answer is yes, explain your reasoning. If your answer is no, what is the new monthly profit and explain your calculation.
4. Only using the sensitivity report (do not change the value and re-run the model), would the optimal production plan change if the profit for each Residential air conditioner change to 1750? If your answer is yes, explain your reasoning. If your answer is no, what is the new monthly profit and explain your calculation.
5. Only using the sensitivity report (do not change the value and re-run the model), can you determine the new objective function value without re-running the model if the number of hours available in the Stamping department change to 8050? If your answer is no, explain your reasoning. If yes, what is the new monthly profit and explain your calculation.
6. Only using the sensitivity report (do not change the value and re-run the model), can you determine the new objective function value without re-running the model if the number of hours available in the Welding department change to 9000? If your answer is no, explain your reasoning. If yes, what is the new monthly profit and explain your calculation.

Note: When optimizing in Excel, use Standard LP Engine.

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