IQ3 - DEA/Duality & Sensitivity analysis

Due Nov 14 at 11:59pm **Points** 100 **Questions** 4
Available until Nov 14 at 11:59pm **Time Limit** 10 Minutes

Instructions

This Individual Quiz has 4 multiple selection questions regarding Duality and DEA. Each Question is worth 25 points (for a total of 100 points).

This quiz was locked Nov 14 at 11:59pm.

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	10 minutes	50 out of 100

Score for this quiz: **50** out of 100
Submitted Nov 14 at 12:25pm
This attempt took 10 minutes.

Question 1

0 / 25 pts

Assume that you solved a *DEA Efficiency model*, where you determined the optimal growth factor ϕ_p^* (i.e., the maximum relative improvement that you should be able to obtain with respect to your current level of outputs).

With this information, now you want to figure out how much your current levels of output are from your ideal output, as well as how much you would be able to reduce your inputs to achieve the same ideal output. To do so, you formulate the problem below, known as the *DEA benchmarking model*, which is similar to the standardized version of the original *DEA Efficiency model*, but now ϕ_p^* is a parameter (the optimal growth factor determined earlier) and the objective function focuses on maximizing the sum of the slacks.

$\max \sum_{r \in O} s_r^- + \sum_{i \in I} s_i^+$

Subject to,

$\sum_{j \in N} y_{rj} \cdot \lambda_j - s_r^- = y_{rp} \cdot \phi_p^* \, \forall \, r \in O$

$\sum_{j \in N} x_{ij} \cdot \lambda_j + s_i^+ = x_{ip} \, \forall \, i \in I$

$\sum_{j \in N} \lambda_j = 1$

$\lambda_j \geq 0 \, \forall \, j \in N$

$s_r^- \geq 0 \, \forall \, r \in O$

$s_i^+ \geq 0 \, \forall \, i \in I$

If the size of the output set $|O| = 2$, the size of the input set $|I| = 3$, and the number of Decision Making Units $|N| = 5$, how many variables would the associated dual problem have?

ou Answered

- (●) 2

- ( ) 3
- ( ) 10

orrect Answer

- ( ) 6
- ( ) 5

Question 2

0 / 25 pts

Assume that you solved a *DEA Efficiency model*, where you determined the optimal growth factor ϕ_p^* (i.e., the maximum relative improvement that you should be able to obtain with respect to your current level of outputs).

With this information, now you want to figure out how much your current levels of output are from your ideal output, as well as how much you would be able to reduce your inputs to achieve the same ideal output. To do so, you formulate the problem below, known as the *DEA benchmarking model*, which is similar to the standardized version of the original *DEA Efficiency model*, but now ϕ_p^* is a parameter (the optimal growth factor determined earlier) and the objective function focuses on maximizing the sum of the slacks.

$$\textbf{max} \sum_{r \in O} s_r^- + \sum_{i \in I} s_i^+$$

Subject to,

$$\sum_{j \in N} y_{rj} \cdot \lambda_j - s_r^- = y_{rp} \cdot \phi_p^* \, \forall \, r \in O$$

$$\sum_{j \in N} x_{ij} \cdot \lambda_j + s_i^+ = x_{ip} \, \forall \, i \in I$$

$$\sum_{j \in N} \lambda_j = 1$$

$$\lambda_j \geq 0 \, \forall \, j \in N$$

$$s_r^- \geq 0 \, \forall \, r \in O$$

$$s_i^+ \geq 0 \, \forall \, i \in I$$

If the size of the output set $|O| = 2$, the size of the input set $|I| = 3$, and the number of Decision Making Units $|N| = 5$, how many constraints would the associated dual problem have?

orrect Answer

- 10
- 3
- 5
- 2

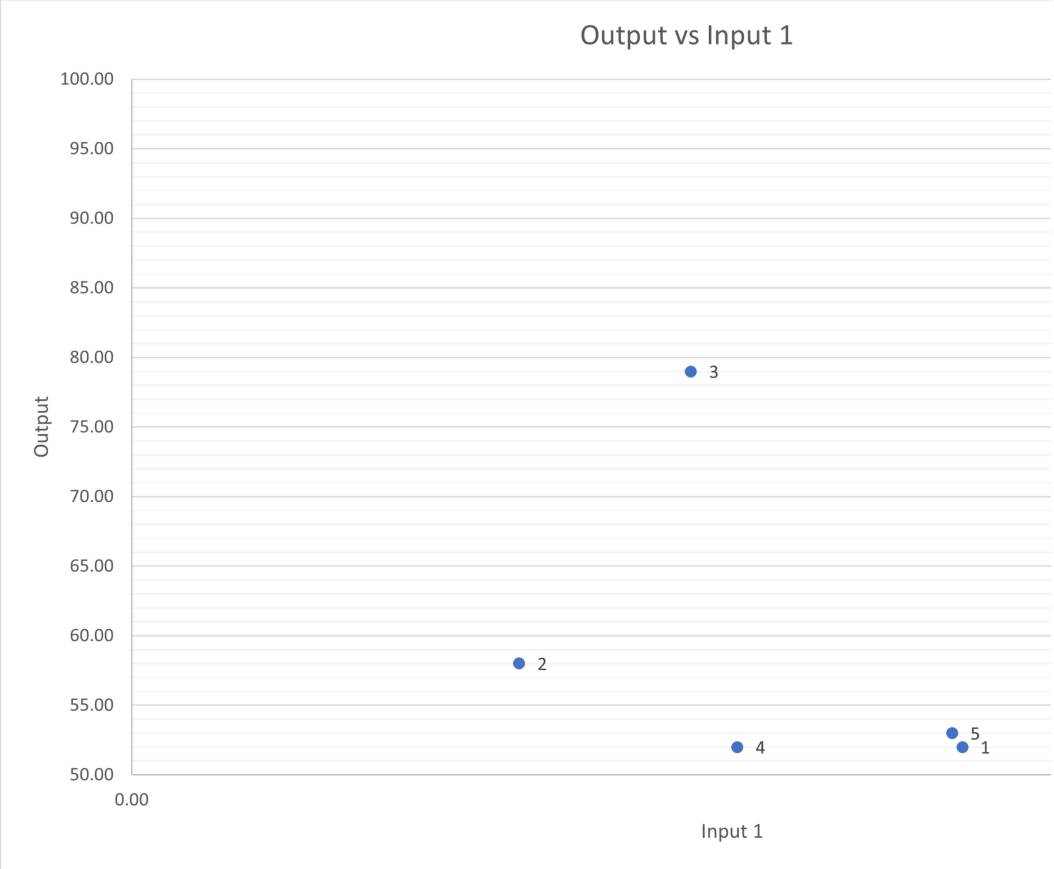
ou Answered

- 6

Question 3

25 / 25 pts

Consider the following the following measures for a DEA problem with one output and one input where you want to have as much output as possible while using as little input as you can:



How many DMU's will be on the efficiency frontier?

- 2
- 4
- 5
- 3

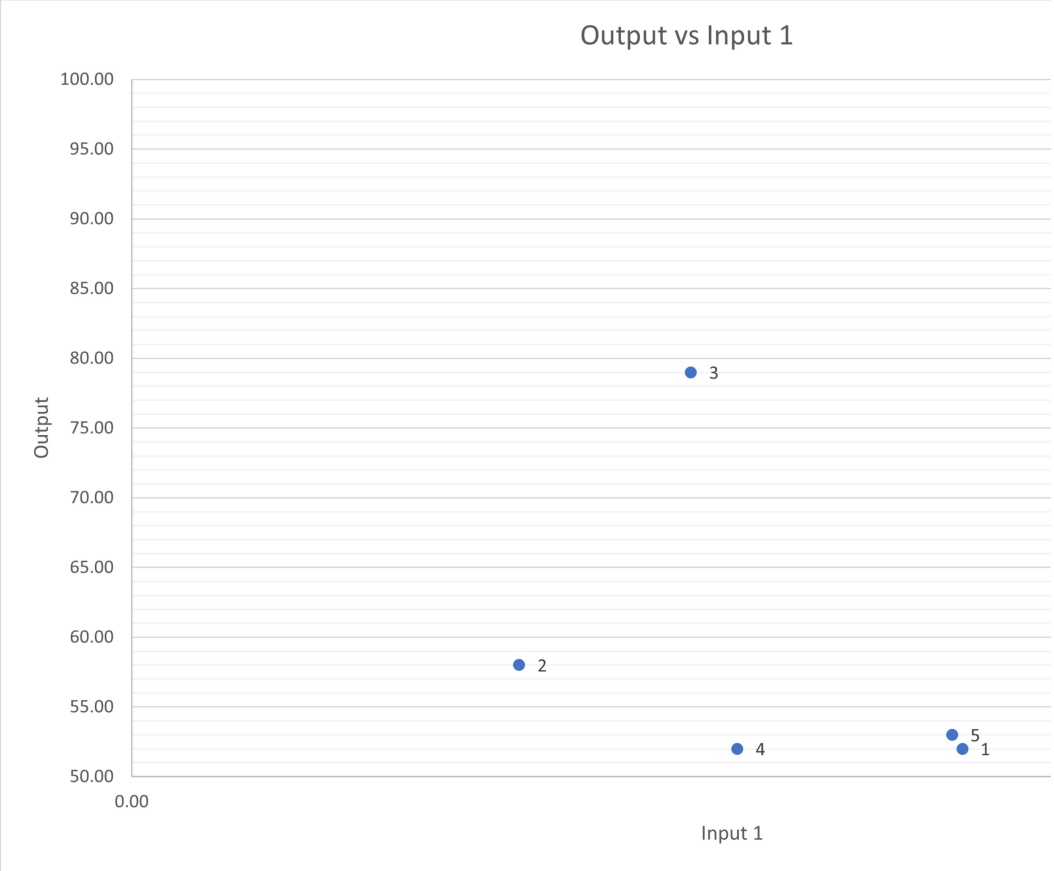
Correct!

1

Question 4

25 / 25 pts

CConsider the following the following measures for a DEA problem with one output and one input where you want to have as much output as possible while using as little input as you can:



For DMU 1, which DMU or DMU's would be part of their reference set?

1 & 4

2 & 3

Correct!

3 & 10

4 & 10

Quiz Score: **50** out of 100