

Input-Output Analysis and Graphing Inequalities

Finite Math

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Outline of Input-Output Analysis Solution

These are the steps to solving an input-output analysis problem:

- 1 Find the technology matrix M and the final demand matrix D .
- 2 Find $I - M$.
- 3 Find $(I - M)^{-1}$.
- 4 Find $X = (I - M)^{-1}D$.
- 5 Interpret the answer in words.

Example of Input-Output Analysis

Example

An economy is based on two industrial sectors, coal and steel. In this economy, to produce \$1 worth of coal requires an input of \$0.10 from the coal sector and \$0.20 from the steel sector; and to produce \$1 worth of steel requires an input of \$0.20 from the coal sector and \$0.40 from the steel sector. The final demand (the demand from all other users of coal and steel) is \$20 billion for coal and \$10 billion for steel. Find the required output from each sector needed to produce this final demand.

Now You Try It!

Example

The economy of a small island nation is based on two sectors, agriculture and tourism. Production of a dollar's worth of agriculture requires an input of \$0.20 from agriculture and \$0.15 from tourism. Production of a dollar's worth of tourism requires an input of \$0.40 from agriculture and \$0.30 from tourism. Find the output from each sector that is needed to satisfy a final demand of \$60 million for agriculture and \$80 million for tourism.

Solution

\$148 million from agriculture and \$146 million from tourism.

Graphing Linear Inequalities in Two Variables

There are 4 types of linear inequalities

$$Ax + By \geq C$$

$$Ax + By > C$$

$$Ax + By \leq C$$

$$Ax + By < C$$

There is a simple procedure to graphing any of these. If equality is not allowed in an inequality, we call it a *strict inequality*, otherwise we simply call it an inequality.

Procedure

- 1 Graph the line $Ax + By = C$ as a dashed line if the inequality is strict. Otherwise, graph it as a solid line.
- 2 Choose a test point anywhere in the plane, as long as it is not on the line.
- 3 Plug the point from step (2) into the inequality. Is the inequality true? Shade in the side of the line with that point. If the inequality is false, shade in the other side.

Graphing Linear Inequalities in Two Variables

Example

Graph the inequality

$$6x - 3y \geq 12$$

Example

Graph the inequality

$$4x + 8y < 32$$

Now You Try It!

Example

Graph the inequality

$$2y \leq 10$$

Example

Graph the inequality

$$2x - 5y > 10$$