

Linear Programming

Binding and Nonbinding Constraints

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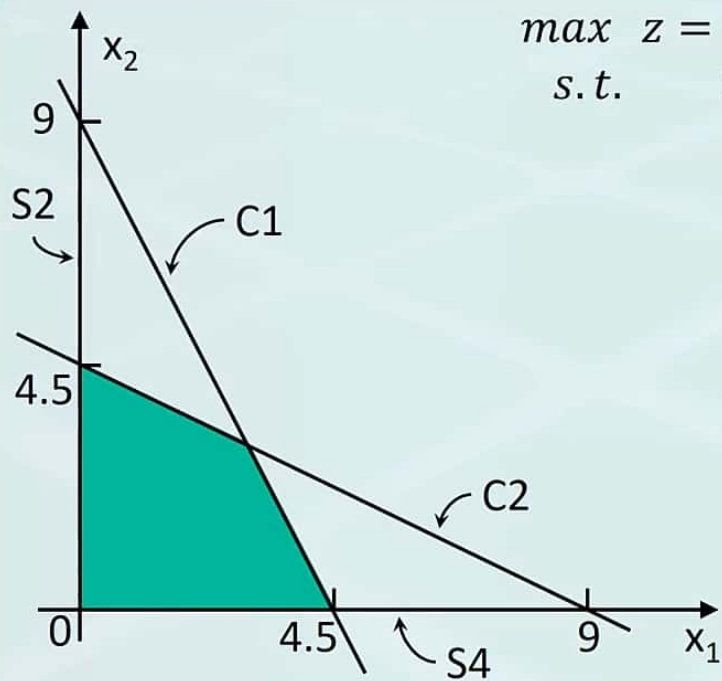
Binding & Nonbinding Constraints

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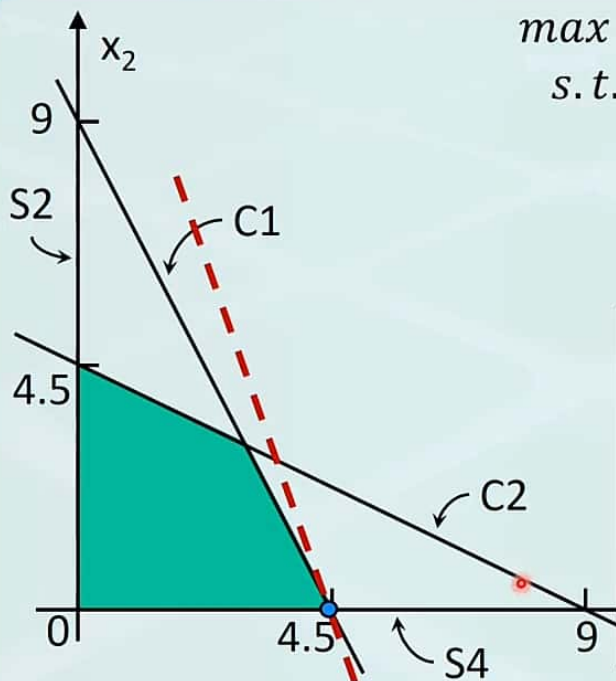
- A constraint is **binding** if the LHS and RHS of the constraint are equal at the optimal solution
- Otherwise, it is **nonbinding**

Example



$$\begin{aligned} \max \quad & z = 3x_1 + x_2 \\ \text{s.t.} \quad & 2x_1 + x_2 \leq 9 \text{ (C1)} \\ & x_1 + 2x_2 \leq 9 \text{ (C2)} \\ & x_1 \geq 0 \text{ (S3)} \\ & x_2 \geq 0 \text{ (S4)} \end{aligned}$$

Example

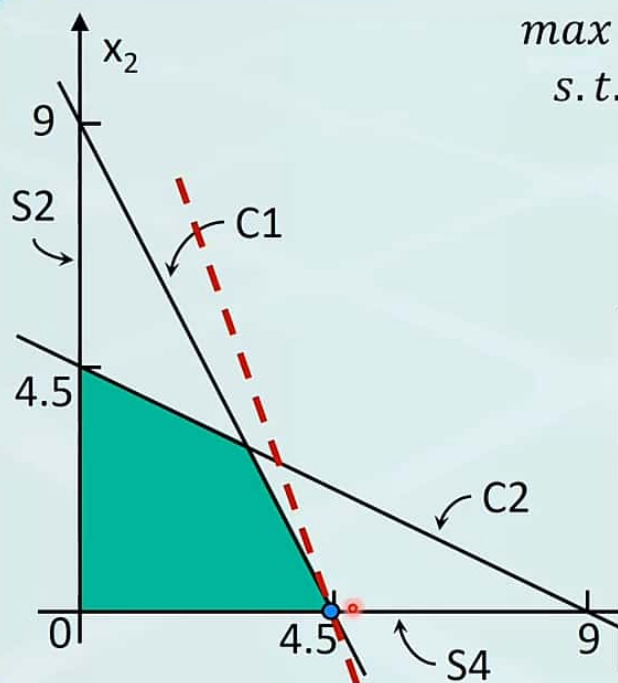


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Optimal Solution: $x_1 = 4.5, x_2 = 0$

C1: $2 \cdot 4.5 + 0 = 9$	binding
C2: $4.5 + 2 \cdot 0 = 4.5 < 9$	nonbinding
S3: $4.5 > 0$	nonbinding
S4: $0 = 0$	binding

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 \max \quad & z = 3x_1 + x_2 \\
 \text{s.t.} \quad & 2x_1 + x_2 \leq 9 \text{ (C1)} \\
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S3: $4.5 > 0$	nonbinding
S4: $0 = 0$	binding

If the optimal solution is on the line,
then it's binding