Assignment Project Exam Help
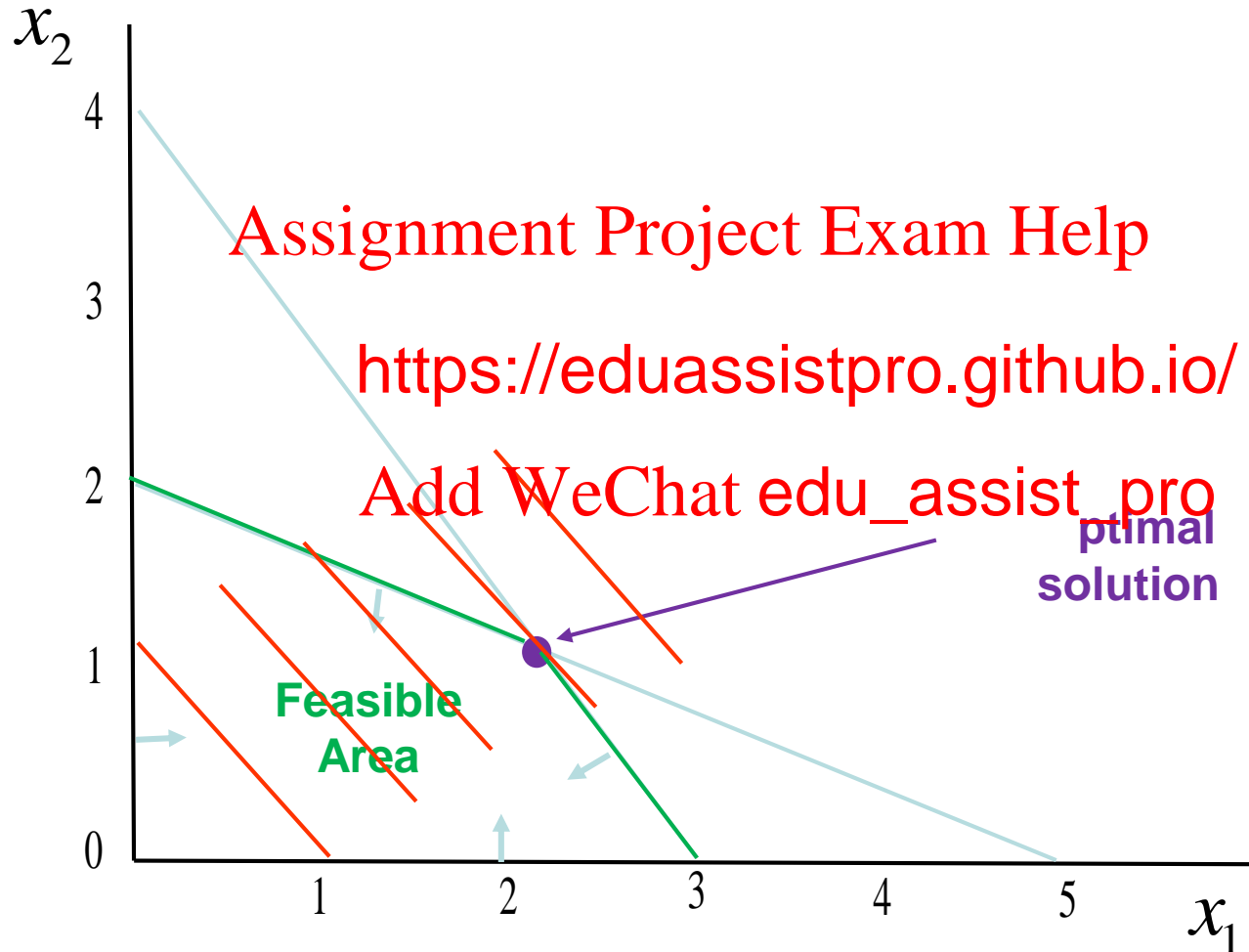
Non-li amming

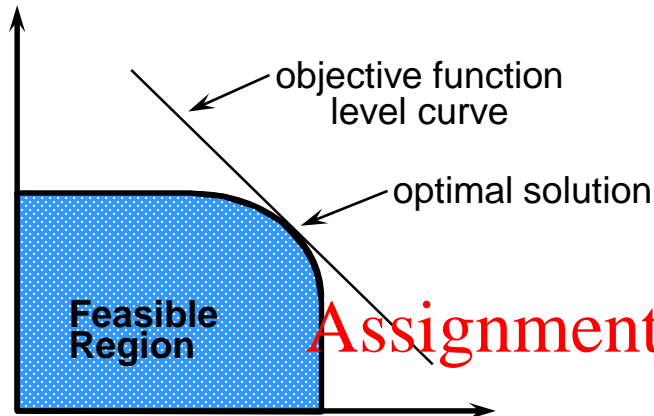https://eduassistpro.github.io/

Non-smoot blems

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CIS 418

Reminder: Linear Programming

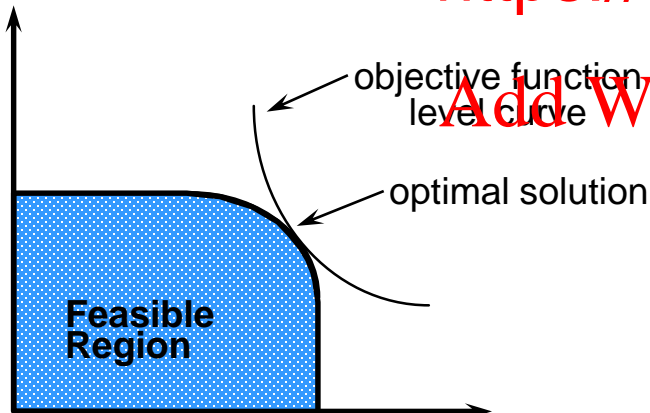Both **objective** and **constraints** are **linear** functions of **decision variables.**

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x_2

4

3

2

1

0

**Feasible
Area**

**ptimal
solution**

1   2   3   4   5 x_1

Non-linear optimization

objective function
level curve

optimal solution

Feasible Region

linear objective, nonlinear constraints

objective function
level curve

optimal solution

Feasible Region

ear objective, constraints

objective function
level curve

optimal solution

Feasible Region

nonlinear objective, nonlinear constraints

objective function
level curves

optimal solution

Feasible Region
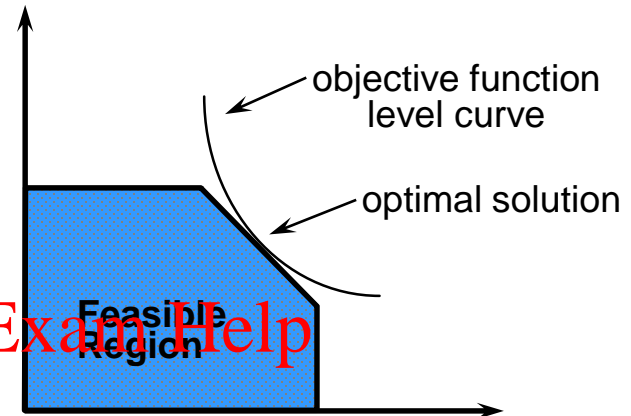
nonlinear objective, linear constraints

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Solution Strategy: Improving Direction

objective function level curves

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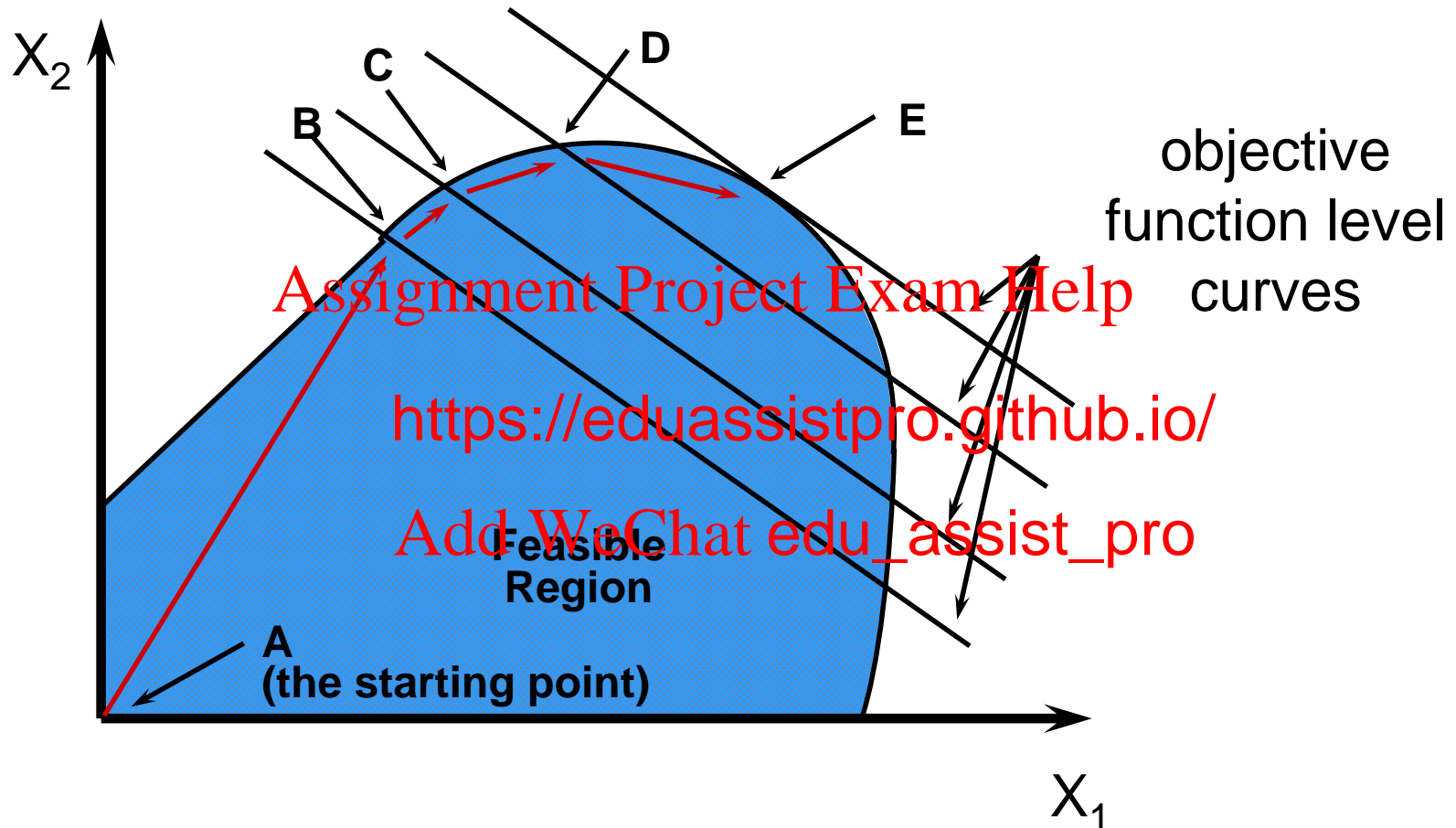
One of the solution strategies for handling non-linear problems is to move as far as possible in improving direction – and find a **global solution**

Non-Smooth Problems
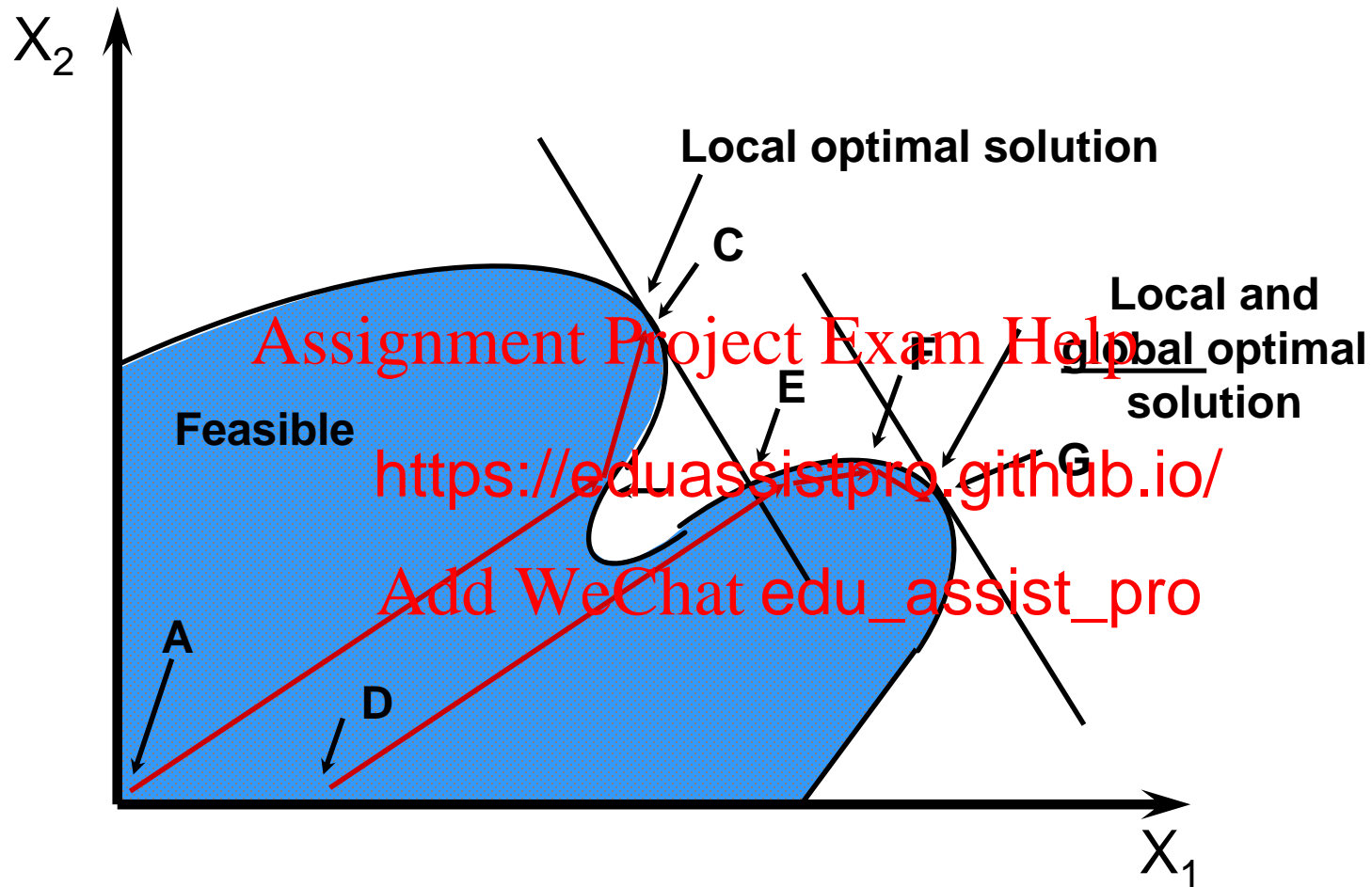
- With a **non-smooth** problem, the algorithm may **not** be able to find the **global optimum.**
- The **starting point influences** the local optimal **solution** obtained.

Example for a non-smooth problem: Snoey Software

Product Cost Data

			High-Speed	Large-Scale	Educational
	Product			$ 100,000	$ -
	Var			$ 20	$ 10

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Market Data

| | | | | Willingness to pay for software version | |
| | | Marketing | | | |
Market Segment	Segment Size	Costs	High-Speed	Large-Scale	Educational
Large Companies	6,000	$ 100,000	$ 1,250	$ 1,000	$ 150
Small Companies	24,000	$ 100,000	$ 500	$ 250	$ 75
Consultants	12,000	$ 200,000	$ 750	$ 500	$ 100
Laboratories	1,200	$ 200,000	$ 1,000	$ 300	$ 125
Students	400,000	$ 300,000	$ 75	$ 40	$ 25

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Formulate the problem

- Objective:
  - Maximize profit
- Decisions:
  - How to price each version
- Constraints:

- Calculations:
  - Revenue
  - Marketing costs
  - Production costs
  - Variable costs

Go to the excel file and calculate the optimal solution using solver

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Simon Business School   CIS-418   Ricky Roet-Green

The computer algorithm can run into a Local Optimum

	Data Table Analysi				Speed Version price $2500		
					Price		
	$5,748,000	$			$	125	$	150
Large-Scale Version Price	$ 40	7,864,000	7,864,000		7,864,000	7,864,000
	$ 250	9,518,000	9,236,000	9,236,000	9,236,000	9,236,000
	$ 300	10,418,000	5,978,000	4,548,000	4,776,000	4,776,000
	$ 500	8,438,000	4,598,000	8,148,000	8,178,000	8,240,000
	$ 1,000	5,748,000	2,208,000	1,228,000	528,000	14,534,000
	Maximum	14,534,000				

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Moving anywhere in the immediate vicinity of this point does not improve profit

The computer algorithm can run into a Local Optimum

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			Price		
$5,748,000	$			$ 125	$ 150
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	Maximum	14,534,000				

This is the global maximum