

Exercise 7 – If Conditionals and Loops

Solving Linear Systems

1. Write a program for solving a linear system by substitution. Save your program as solLinSysSub.py.

<u>Input</u>	<u>Output</u>
<p>A pair of equations of the form:</p> $y = Ax + B$ $y = Cx + D$ <p>where A, B, C and D can be any four numbers.</p> <p>(Example, if $y = 2x - 5$ and $y = -7x$, then $A=2$, $B=-5$, $C=-7$ and $D=0$)</p>	<p>EITHER:</p> <ul style="list-style-type: none">• The statement “<i>No solution, because the lines are parallel</i>”• <u>OR</u> the statement “<i>Infinitely many solutions, because the two lines are the same.</i>”• <u>OR</u> the solution to the system if neither of the above is true. This part should be a formula in terms of A, B, C and D.

Algorithm

if $A = C$:

 if $B = D$: (for example, $y = 3x + 5$ and $y = 3x + 5$)

 output “Infinitely many solutions, because these are coincident lines.”

 else: (for example, $y = 3x + 5$ and $y = 3x + 2$)

 output “No solutions, because the lines are parallel.”

else:

$$x = \frac{D-B}{A-C}$$

$$y = \frac{AD-BC}{A-C}$$

output “The solutions are” x and y

2. Write a program for solving a linear system by elimination. Save your program as solLinSysEli.py.

$$\begin{cases} Ax + By = C \\ Dx + Ey = F \end{cases}$$

Sample runs:

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Welcome to the linear system solver!

Enter a problem of the form:

Ax + By = C

Dx + Ey = F

Enter the value of A: 1

Enter the value of B: 2

Enter the value of C: 3

Enter the value of D: 4

Enter the value of E: 5

Enter the value of F: 6

THE SOLUTION IS x = -1.0 and y = 2.0

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Welcome to the linear system solver!

Enter a problem of the form:

Ax + By = C

Dx + Ey = F

Enter the value of A: 2

Enter the value of B: 4

Enter the value of C: 6

Enter the value of D: 1

Enter the value of E: 2

Enter the value of F: 3

Coincident lines ==> Infinitely many solutions.

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Welcome to the linear system solver!

Enter a problem of the form:

$$Ax + By = C$$

$$Dx + Ey = F$$

Enter the value of A: -5

Enter the value of B: 1

Enter the value of C: 6

Enter the value of D: -5

Enter the value of E: 1

Enter the value of F: 3

Parallel lines ==> No solution.