**Solving Simultaneous Equations**

A system of linear equations is a set of nlinear equations in which each equation contains up to *n* variables or "unknowns". A simple example might be to find x and ygiven:

2x + 3y - 3 = 0

3x + 2y - 5 = 0

1. Create a worksheet to solve the simultaneous equations.

|  |  |  |  |
| --- | --- | --- | --- |
| System of Equations |  |  |  |
|  |  |  |  |
| Variables |  | Equations | Absoulte Values |
| x | 0 | -3 | 3 |
| y | 0 | -5 | 5 |
|  |  |  | Sum = |

The cells with formulas are:

C4: =2\*B4 + 3\*B5-3 the first equation in Equation

C5: =3\*B4 + 2\*B5-5 the second equation in Equation

D4: =ABS(C4)

D5: =ABS(C5)

D6: =D4+D5

1. MakeD6 the active cell and start Solver. The *Set Target Cell* should contain D6. Set *Equal to* Value ( ) and in the *By Changing Cells* box, type B4:B5. Alternatively, press the Guess button, and Solver will correctly set the output   
   cells to B4:B5. Used GRG Nonlinear option
2. Press Solver's *Solve* button. Solver reports that it could not find a feasible solution. However, it seems to have found a reasonably good approximation. Press the OK button. The results are shown in the top half of Figure below. The value in D6 is reasonably close to zero but it is not within the default precision of 1 X 10-5

|  |  |  |  |
| --- | --- | --- | --- |
| System of Equations |  |  |  |
|  |  |  |  |
| Variables |  | Equations | Absolute Values |
| x | 1.137799 | 1.6555004 | 1.655500384 |
| y | 0.793301 | -1.903E-06 | 1.90347E-06 |
|  |  | Sum = | 1.655502287 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Microsoft Excel 16.0 Feasibility Report** | | | | | | | | | |  |
| **Worksheet: [simultaneousequations.xlsx]Sheet1** | | | | | | | | | | |
| **Report Created: 3/21/2019 12:25:46 PM** | | | | | | | | | |  |
|  | | | | |  |  | |  | |  |
|  | | | | |  |  | |  | |  |
| Constraints Which Make the Problem Infeasible | | | | | | | | | | |
| **Cell** | **Name** | **Cell Value** | **Formula** | **Status** | | | **Slack** | |
| Microsoft Excel 16.0 Feasibility Report | | | | |  |  | |  | |  |

Activate Solver a second time and note the improvement in the D6 value. Use Solver a third time. It now reports that it has found a solution. Giving Solver yet another go has no effect. The value in D6 is 1.655502287, which is within the precision. The *x* and y values are as shown in the lower half of

You may wish to reset B4 and B5 to 0 and try using Solver with larger values for *Max Time* and *Iterations.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Microsoft Excel 16.0 Feasibility Report** | | | |  |  |  |
| **Worksheet: [simultaneousequations.xlsx]Sheet1** | | | | |  |  |
| **Report Created: 3/21/2019 12:55:31 PM** | | | |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| Constraints (not including Variable Bounds) Which Make the Problem Infeasible | | | | | | |
|  | **Cell** | **Name** | **Cell Value** | **Formula** | **Status** | **Slack** |
|  | $D$6 | Sum = Absolute Values | 1.655502287 | $D$6=0 | Violated | -1.655502287 |