**Solving systems of equations – with Sage**

M=MatrixSpace(QQ,3)

|  |  |
| --- | --- |
|  |  |

I=M([1,0,0,0,1,0,0,0,1]); I 

|  |  |
| --- | --- |
|  | [1 0 0]  [0 1 0]  [0 0 1] |
|  |  |

MC=MatrixSpace(QQ,3,1)

b=MC([0,1,0]); b

|  |  |
| --- | --- |
|  | [0]  [1]  [0] |

# Working on problem 14a in Rorres section 1.6

|  |  |
| --- | --- |
|  |  |

A=M([1,3,5,-1,2,0,2,5,4]); A

|  |  |
| --- | --- |
|  | [ 1 3 5]  [-1 2 0]  [ 2 5 4] |

C=A\b; C

|  |  |
| --- | --- |
|  | [-13/25]  [ 6/25]  [ -1/25] |

C1=A.solve\_right(b); C1

|  |  |
| --- | --- |
|  | [-13/25]  [ 6/25]  [ -1/25] |

C2=A.augment(b) C2

|  |  |
| --- | --- |
|  | [ 1 3 5 0]  [-1 2 0 1]  [ 2 5 4 0] |

C2.echelon\_form()

|  |  |
| --- | --- |
|  | [ 1 0 0 -13/25]  [ 0 1 0 6/25]  [ 0 0 1 -1/25] |

A\_inv=A.inverse() A\_inv

|  |  |
| --- | --- |
|  | [ -8/25 -13/25 2/5]  [ -4/25 6/25 1/5]  [ 9/25 -1/25 -1/5] |

C3=A\_inv\*b C3

|  |  |
| --- | --- |
|  | [-13/25]  [ 6/25]  [ -1/25] |

C4=A.augment(I) C4

|  |  |
| --- | --- |
|  | [ 1 3 5 1 0 0]  [-1 2 0 0 1 0]  [ 2 5 4 0 0 1] |

C4.echelon\_form()

|  |  |
| --- | --- |
|  | [ 1 0 0 -8/25 -13/25 2/5]  [ 0 1 0 -4/25 6/25 1/5]  [ 0 0 1 9/25 -1/25 -1/5] |

#Notice that the result above is I | A\_inv

#Notice that we can get the solution to Ax = b as C, or C1, or the rightmost column of   
#C2.echelon\_form() or C3

|  |  |
| --- | --- |
|  |  |