```
> restart : with(LinearAlgebra) : with(plots) : with(plottools):
  # i)
> A := Matrix([[1, 1], [2, 4], [3, 9]])
```

$$A := \begin{bmatrix} 1 & 1 \\ 2 & 4 \\ 3 & 9 \end{bmatrix} \quad (1)$$

```
> y := Vector([10.1, 7.4, −5.2])
```

$$y := \begin{bmatrix} 10.1 \\ 7.4 \\ -5.2 \end{bmatrix} \quad (2)$$

```
> result := LeastSquares(A, y)
```

$$result := \begin{bmatrix} 15.3552631578947 \\ -5.71315789473684 \end{bmatrix} \quad (3)$$

```
> v_0 := result[1]
```

$$v\_0 := 15.3552631578947 \quad (4)$$

```
> g := result[2]·(−1)·(2)
```

$$g := 11.4263157894737 \quad (5)$$

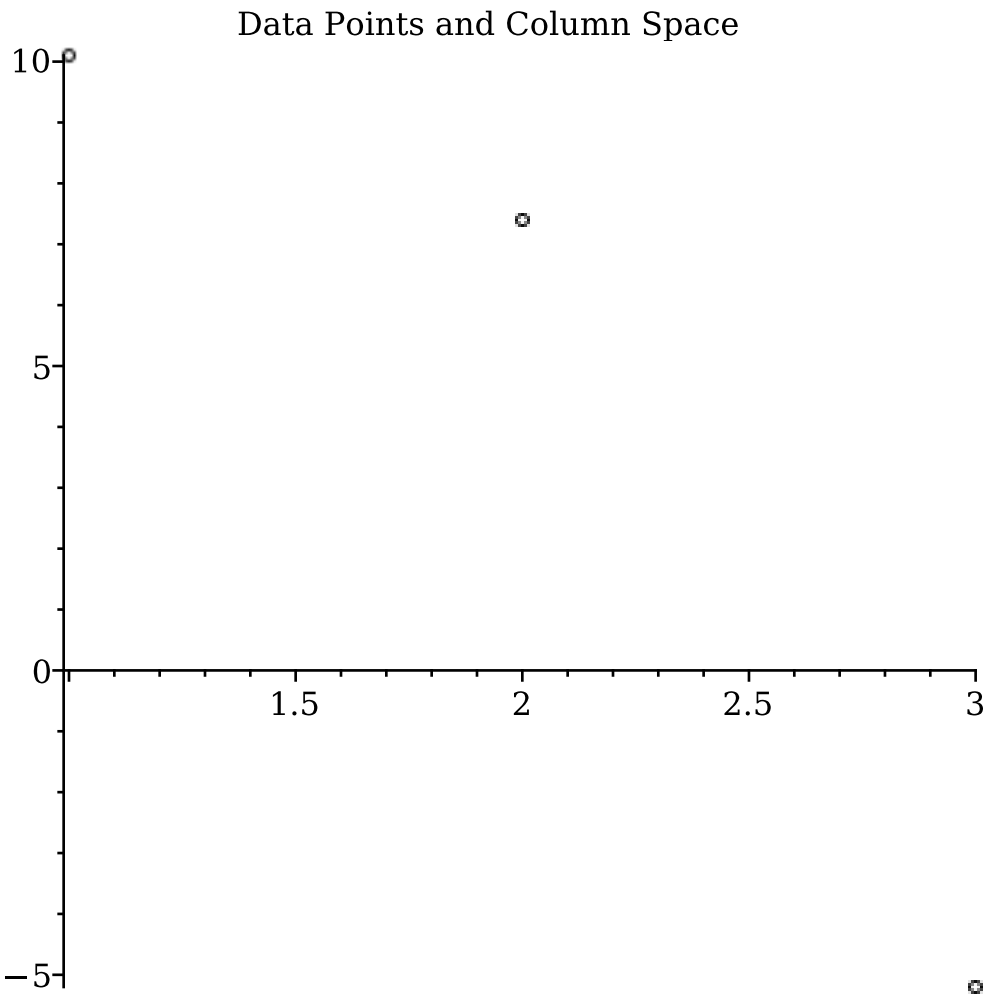
```
> #ii) zie notes
> #iii)
> y_tilde := A . result;
```

$$y\_tilde := \begin{bmatrix} 9.64210526315789 \\ 7.85789473684210 \\ -5.35263157894737 \end{bmatrix} \quad (6)$$

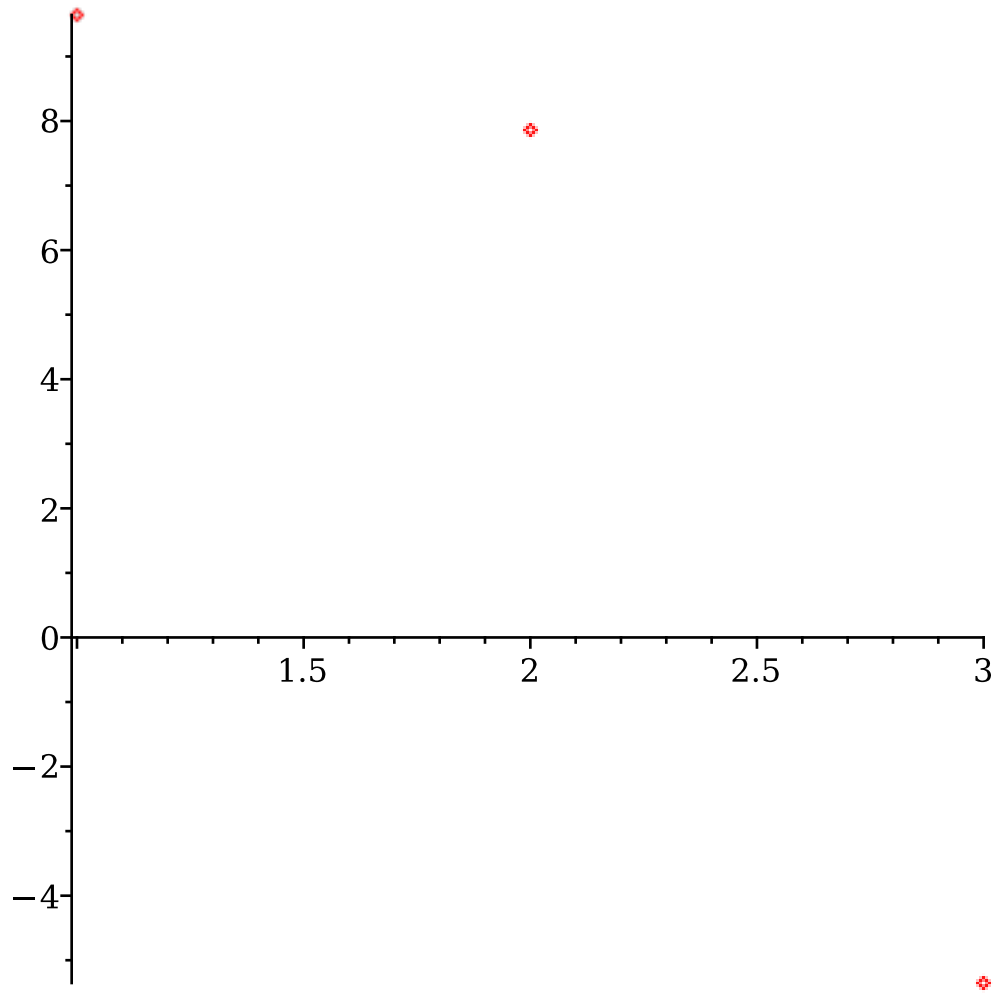
```
> column_space_vector := Column(A, 2);
```

$$column\_space\_vector := \begin{bmatrix} 1 \\ 4 \\ 9 \end{bmatrix} \quad (7)$$

```
> # Define line representing the column space K(A)
  K_A := plot([t → column_space_vector[1] * t, t → column_space_vector[2] * t, t
      = −1..3], color = blue, thickness = 2, title = "Column Space K(A)");
Error, (in plot) expected a range but received t = -1 .. 3
> # Plot the original data points y
  data_points := plot([seq([i, y[i]], i = 1..3)], style = point, symbol = circle, color
      = black, title = "Data Points and Column Space");
```




```
> # Plot the least squares approximation y_tilde as a point
  y_tilde_point := plot([seq([i, y_tilde[i]], i = 1..3)], style = point, symbol
      = diamond, color = red);
```




```
> # Draw the difference vector y - y_tilde as arrows from y_tilde to y
  diff_vector_plots := [seq(`arrow`([i, y_tilde[i]], [i, y[i]], 0.1, color = green), i
      = 1..3)];

  # Display all plots
  display([K_A, data_points, y_tilde_point] + diff_vector_plots);
```

Error, (in plottools:-arrow) invalid input: plottools:-arrow0 uses a 6th argument, hh, which is missing

Error, (in plots:-display) expecting plot structure but received: [K_A, PLOT(CURVES(Matrix(3, 2, [[1.,10.1],[2.,7.4],[3.,-5.2]], datatype = float[8])),COLOUR(RGB,0.,0.,0.),STYLE(POINT),SYMBOL(CIRCLE),TITLE("Data Points and Column Space"),AXESLABELS("",""),VIEW(DEFAULT,DEFAULT),_ATTRIBUTE("input" = [table([(1)=plot,(2)=[[[1., 10.1], [2., 7.4], [3., -5.2]]],(3)=(style = plottools:-point),(4)=(symbol = plottools:-circle),(5)=(color = black),(6)=(title = "Data Points and Column Space")]), "originalview" = [1. .. 3., -5.20000000000000018 .. 10.0999999999999996]])), PLOT(CURVES(Matrix(3, 2, [[1.,9.64210526315789],[2.,7.8578947368421],[3., -5.35263157894737]], datatype = float[8])),COLOUR(RGB,1.00000000,0., 0.),STYLE(POINT),SYMBOL(DIAMOND),AXESLABELS("",""),VIEW(DEFAULT, DEFAULT),_ATTRIBUTE("input" = [table([(1)=plot,(2)=[[[1., 9.64210526315789], [2., 7.8578947368421], [3., -5.35263157894737]]],(3)

```
=(style = plottools:-point),(4)=(symbol = diamond),(5)=(color = red)]
), "originalview" = [1. .. 3., -5.35263157894736796 ..
9.64210526315788741]]))]+diff_vector_plots
>
```