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> with(linalg):
> with(plots):
> # example of least squares solution to inconsistent equation
> A:=matrix(3,2,[-2,1,1,-1,1,0]);
      A :=  $\begin{bmatrix} -2 & 1 \\ 1 & -1 \\ 1 & 0 \end{bmatrix}$ 
> gaussjord(A);
       $\begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 0 & 0 \end{bmatrix}$ 
> b:=matrix(3,1,[1,0,1]);
      b :=  $\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$ 
> linsolve(A,b);
> # no answer; equations are inconsistent
> B:=evalm(transpose(A)*A);
      B :=  $\begin{bmatrix} 6 & -3 \\ -3 & 2 \end{bmatrix}$ 
> c:=evalm(transpose(A)*b);
      c :=  $\begin{bmatrix} -1 \\ 1 \end{bmatrix}$ 
> linsolve(B,c);
       $\begin{bmatrix} \frac{1}{3} \\ 1 \end{bmatrix}$ 
> # example of using least squares to fit best line to data
> # list of points in data set
> l:=[[1,1],[2,2],[3,4]];
      l := [[1, 1], [2, 2], [3, 4]]
> C:=matrix(3,2,[1,1,1,2,1,3]);
      C :=  $\begin{bmatrix} 1 & 1 \\ 1 & 2 \\ 1 & 3 \end{bmatrix}$ 
> d:=matrix(3,1,[1,2,4]);
      d :=  $\begin{bmatrix} 1 \\ 2 \\ 4 \end{bmatrix}$ 
> linsolve(C,d);

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> # no solution, because points don't lie on a line.
> CC:=evalm(transpose(C)*C);
      CC :=  $\begin{bmatrix} 3 & 6 \\ 6 & 14 \end{bmatrix}$ 
> dd:=evalm(transpose(C)*d);
      dd :=  $\begin{bmatrix} 7 \\ 17 \end{bmatrix}$ 
> linsolve(CC,dd);
       $\begin{bmatrix} -\frac{2}{3} \\ \frac{3}{2} \end{bmatrix}$ 
> P:=PLOT(POINTS([1,1],[2,2],[3,4],SYMBOL(CIRCLE))):
> Q:=plot(-2/3+3/2*t,t=-.2..4):
> #display(P,Q);

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