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% LS_line_fit_IO.m  11-sept-2014
% example matlab script to solve indirect observation problem
% fitting a line to 3 points
% y=observations, x=constants, equal weights
% y + vy = m*x + b, rearrange into the form v + B*delta = f
% vy - m*x - b = -y   or
% vy + [-x -1][m] = -y
%              [b]

n=3;
n0=2;
r=n - n0;

y=[1.0;1.6;2.0];
x=[1.0;2.0;3.0];

W=[1 0 0;
   0 1 0;
   0 0 1];
B=[-x(1)  -1;
   -x(2)  -1;
   -x(3)  -1];
f=[-y(1);
   -y(2);
   -y(3)];

N=B'*W*B;
t=B'*W*f;

del=inv(N)*t;
m=del(1)
b=del(2)

v=f-B*del
yhat=y + v

plot(x,y,'r*');
hold on
px=[0;4];
py=[b;m*4+b];
plot(px,py,'b-');

for i=1:n
  px=[x(i);x(i)];
  py=[y(i);yhat(i)];
  plot(px,py,'k-');
  end
axis equal
```