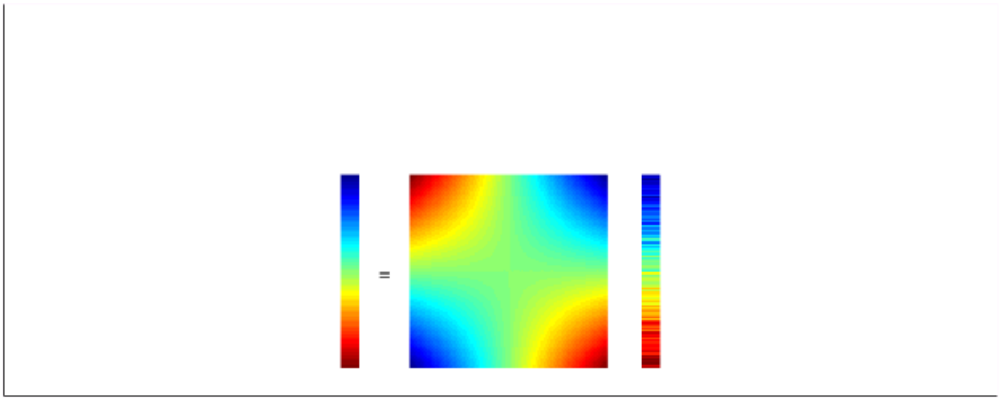
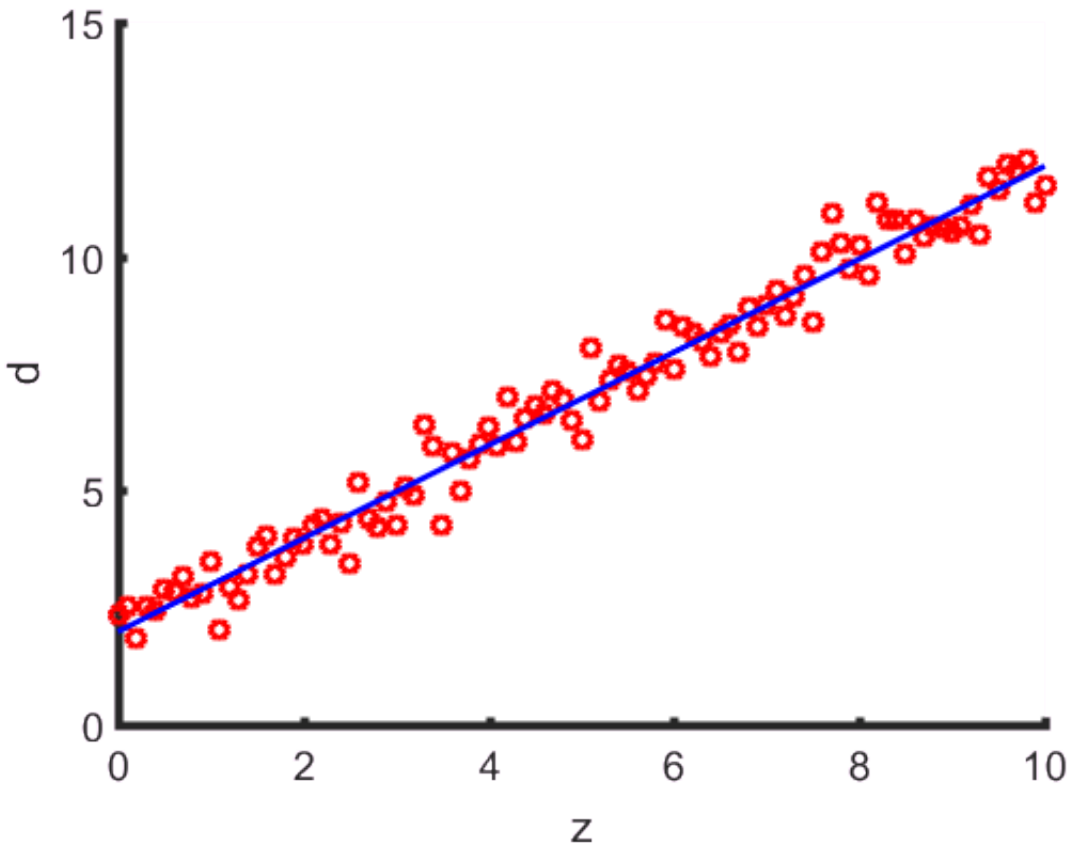
```
% gda04_01
%
% data Resolution Matrix example
% supports Figure 4.1

clear all;

% auxially variable z
N=101;
zmin=0;
zmax=10;
Dz = (zmax-zmin)/(N-1);
z = zmin + Dz*[0:N-1]';

% create synthetic data
% d = a + b*z + noise
a=2.0;
b=1.0;
sd=0.5;
dtrue = a+b*z;
dobs = dtrue+random('Normal',0,sd,N,1);

% least squares fit
M=2;
G=[ones(N,1), z]; % data kernel
GMG = (G'*G)\G'; % generalized inverse
mest = GMG * dobs;
dpre = G*mest;

% predicted data
dpre = G*mest;
e = dobs - dpre;
[emax, iemax] = max(abs(e));

% compute and plot data resolution matrix
Nres = G*GMG;
gda_draw(' ',dpre,'=',' ',Nres,' ',dobs);
```




```
% Figure 4.1 (B) Actual N for the case of fitting a straight line to 100 data, equally spaced
% along the z-axis. Large values (red colors) occur only near the ends of the main diagonal (c
% indicating that the resolution is poor at intermediate values of z. MatLab script gda04_01.

% plot
```

```
figure(2);
clf;

% plot scale
pdmin=0;
pdmax=15;

% plot observed and predicted data
set(gca,'LineWidth',3);
set(gca,'FontSize',14);
hold on;
axis( [zmin, zmax, pdmin, pdmax ]' );
plot( z, dobs, 'ro', 'LineWidth', 2);
plot( z, dpre, 'b-', 'LineWidth', 2);
xlabel('z');
ylabel('d');
```




```
% Figure. Straight line fit (blue) to data d(z) illustrates geometry of problem
% used in the calculation of the data resolution matrix N, above.
```