```
% gda09_01
%
% Least squares fit of straight line
% to d(z) and z(d).
% Supports calculation in Section 9.1

clear all;

% auxially variable z and data d
z = [1, 2, 3, 4]';
d = [1, 2, 3, 5]';
N=length(z);

% least squares fit to d(z)
M=2;
G=[ones(N,1), z];
mest = (G'*G)\(G'*d);
dpre = G*mest;
fprintf('d(z): intercept %f slope %f\n', mest(1), mest(2) );
```

```
d(z): intercept -0.500000 slope 1.300000
```

```
% least squares fit to  z(d)
G2=[ones(N,1), d];
mest2 = (G2'*G2)\(G2'*z);
dpre2 = G2*mest2;

% convert model parameters for z(d) case to d(z)
mest3=zeros(2,1);
mest3(1)=-mest2(1)/mest2(2);
mest3(2)=1/mest2(2);
dpre3=G*mest3;

fprintf('dp(zp): intercept %f slope %f\n', mest2(1), mest2(2) );
```

```
dp(zp): intercept 0.457143 slope 0.742857
```

```
fprintf('zp(dp): intercept %f slope %f\n', mest3(1), mest3(2) );
```

```
zp(dp): intercept -0.615385 slope 1.346154
```

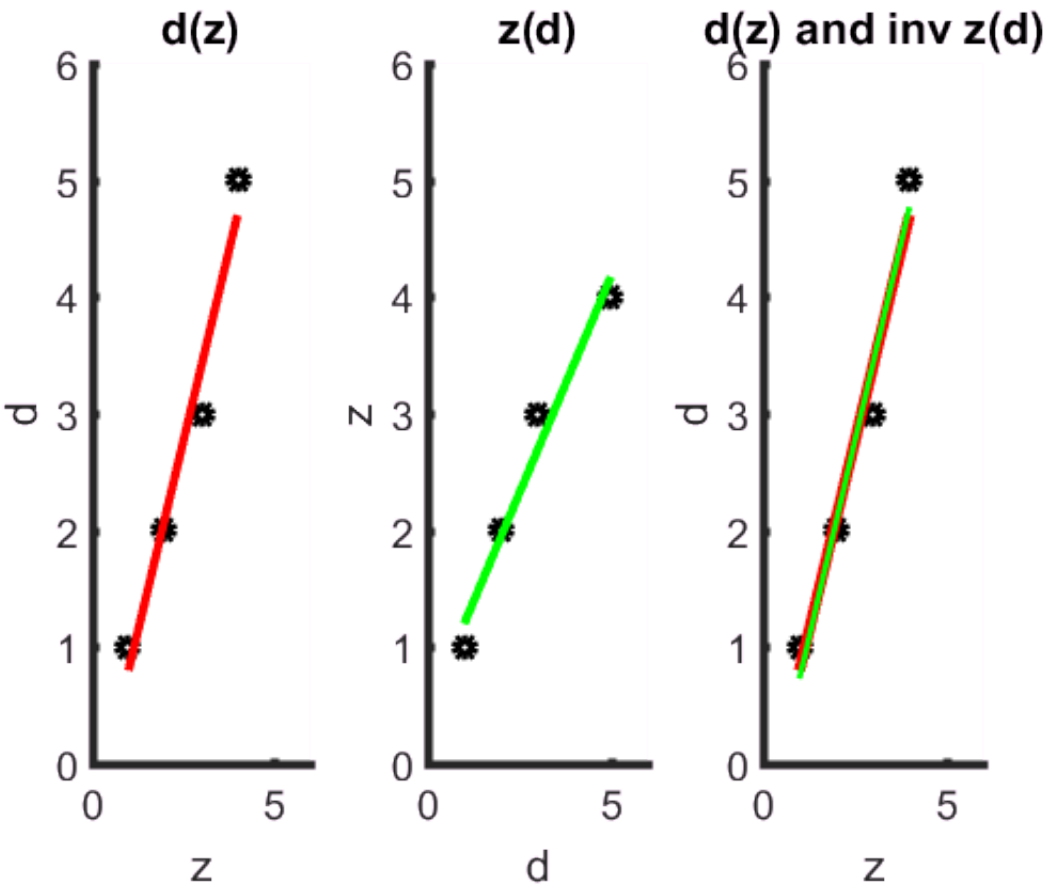
```
% plot d(z) case
figure(1);
clf;
subplot(1,3,1);
set(gca,'LineWidth',3);
set(gca,'FontSize',14);
hold on;
axis( [0, 6, 0, 6] );
plot( z, d, 'ko', 'LineWidth', 3);
plot( z, dpre, 'r-', 'LineWidth', 3);
xlabel('z');
ylabel('d');
title('d(z)');

% plot z(d) case
```

```
subplot(1,3,2);
set(gca,'LineWidth',3);
set(gca,'FontSize',14);
hold on;
axis( [0, 6, 0, 6] );
plot( d, z, 'ko', 'LineWidth', 3);
plot( d, dpre2, 'g-', 'LineWidth', 3);
xlabel('d');
ylabel('z');
title('z(d)');

% plot z(d) and transformed z(d) cases
subplot(1,3,3);
set(gca,'LineWidth',3);
set(gca,'FontSize',14);
hold on;
axis( [0, 6, 0, 6] );
plot( z, d, 'ko', 'LineWidth', 3);
plot( z, dpre, 'r-', 'LineWidth', 4);
plot( z, dpre3, 'g-', 'LineWidth', 2);

xlabel('z');
ylabel('d');
title('d(z) and inv z(d)');
```




```
% Figure. (A) Least squares fit (red line) to d(z) data (stars). (B) least squares
% fit (green line) to z(d) data (stars). (C) Fit of d(z) (red line) compared to inverted
% version of z(d) fit.  The two lines are similar, but not identical.
```