Solutions

Correlation and nearest correlation matrices

The following script and functions solve both problems:

```
% Read in data and generate correlation matrix
[x,ifail] = getcorrelation

% Set correlation between 1st and 10th stocks
x(1,10) = 0.2;
x(10,1) = 0.2;

% Test for true correlation matix
smallest = min(eig(x));
if (smallest < 0)
   fprintf(' Matrix is not a correlation matrix,\n');
   fprintf(' there are negative eigenvalues\n');
end

% Generate nearest correlation matrix
[c, ifail] = getnearest(x)
```

```
function [x,ifail] = getcorrelation
% Reads in data and forms correlation matrix with g02bx

% Read data from file
fid = fopen('rawdata.dat');
at = zeros(10,91);
[at,count] = fscanf(fid, '%f', [10 91]);
a = at';
clear at

% Using the data in A, form a correlation matrix
weight = 'u';
wt = zeros(1,1);
[xbar, std, v, x, ifail] = g02bx(weight, a, wt);
clear xbar std v;
disp(['Ifail ' int2str(ifail)])

end
```

```
function [c, ifail] = getnearest(g)
% Computes nearest correlation matrix with g02aa

% Set parameters
errtol = 1e-07;
maxits = int32(200);
maxit = int32(10);
[gOut, c, iter, feval, nrmgrd, ifail] = ...
                      g02aa(g, errtol, maxits, maxit);

% Print results
if (ifail == 0)
  fprintf('\n     Nearest Correlation Matrix\n');
  disp(c);
  fprintf('\n Number of Newton steps taken:   %d\n', iter);
  fprintf(' Number of function evaluations: %d\n', feval);
  if (nrmgrd > errtol)
    fprintf(' Norm of gradient of last Newton step: %6.4f\n', ...
                                                        nrmgrd);
  end
end

clear errtol maxits maxit iter feval nrmgrd

end
```