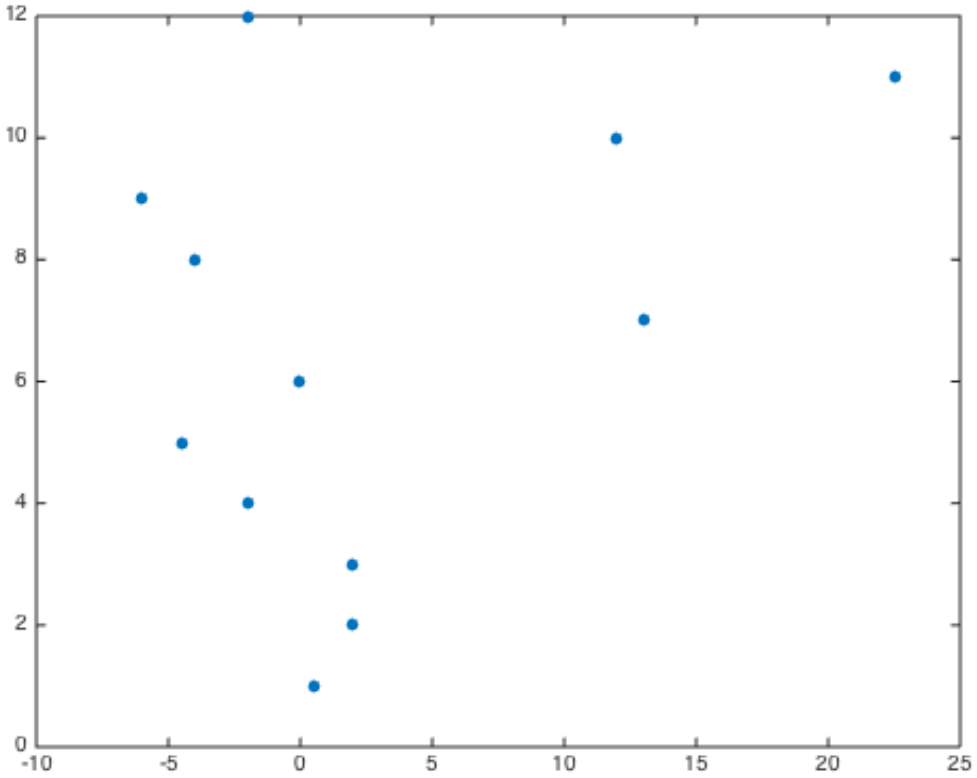
Contents

Part C

```
robot_coin_collector;

A = [   0.5 0 0 0 0 0
        2 0 0 0 0 0;
        4 0.5 0 0 0 0;
        6 2 0 0 0 0;
        8 4 0.5 0 0 0;
        10 6 2 0 0 0;
        12 8 4 0.5 0 0;
        14 10 6 2 0 0;
        16 12 8 4 0.5 0;
        18 14 10 6 2 0;
        20 16 12 8 4 0.5;
        22 18 14 10 6 2];

fEst = (A'*A)\A'*x;

res = norm(A*fEst - x)^2;

if( res > 0.0001)
    ['The robot is not able to collect all of the coins. The residual is ' num2str(res)]
else
    'The robot is able to collect all coins becaues J = 0'
end
```

```
ans =

The robot is not able to collect all of the coins. The residual is 37.992
```



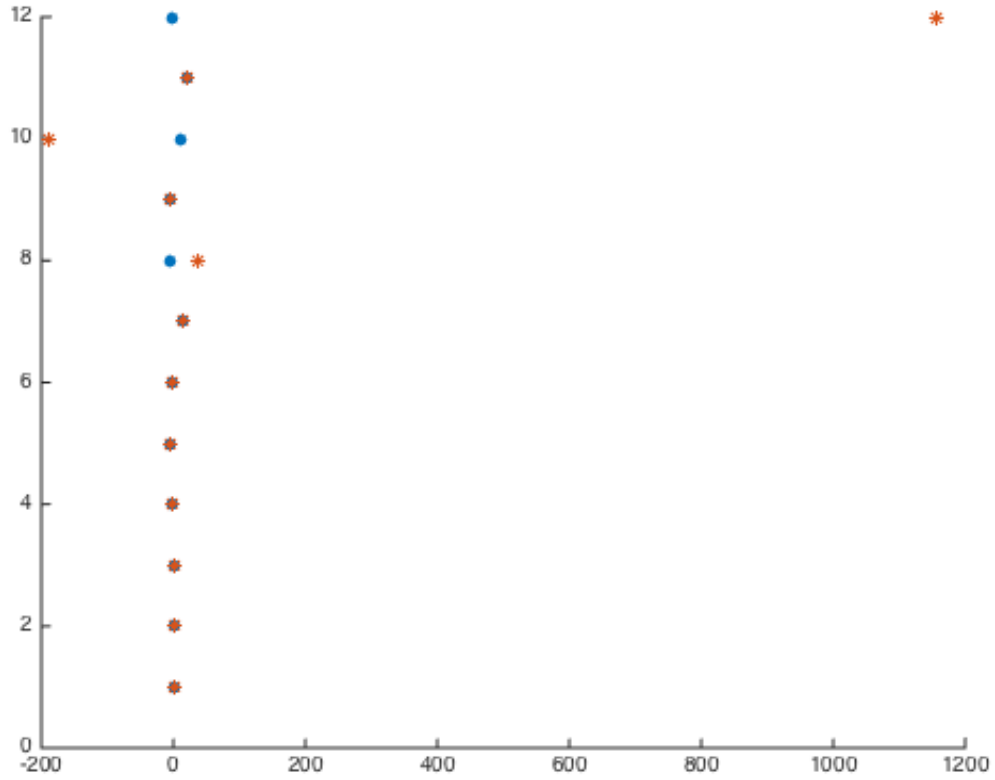
Part E

```
for i = 1:2*n
    if i == 1
        A = 0.5;
        continue;
    elseif i == 2
        A = [0.5;2];
        continue;
    %even rows
    elseif mod(i,2) == 0
        %new row will be of length i/2
        arow = zeros(1, i/2);
        arow(end) = 2;
        for j = 1:length(arow)-1
            arow(j) = 2*(i-1) - 4*(j-1);
        end
   %odd rows
    else
        arow = zeros(1, (i+1)/2);
        arow(end) = 0.5;
        for j = 1:length(arow)-1
            arow(j) = 2*(i-1) - 4*(j-1);

        end
    end

    if( mod(i,2) ~= 0)
        A = [A zeros(i-1,1)];
```

```
    end
    A = [ A ; arow];

    % Test for which coin cannot be reached
    %Least squares to get forces
    if mod(i,2) ~= 0
        rows = 1:2:i;
        f = (A(rows,:)'*A(rows,:))\A(rows,:)'*x(rows);%x(1:i);
    end
    res = norm(A*f - x(1:i))^2;
    if res > 0.0001
       ['The residual is non-zero and therefore coin ' num2str(i) ' cannot be reached']
        %break;
    end
end

xpositions = A*forces;
forces

figure; hold;
plot(x,1:2*n,'.','MarkerSize',20);
plot(xpositions, 1:2*n, '*');
```

```
ans =

The residual is non-zero and therefore coin 8 cannot be reached


ans =

The residual is non-zero and therefore coin 9 cannot be reached


ans =

The residual is non-zero and therefore coin 10 cannot be reached


ans =

The residual is non-zero and therefore coin 11 cannot be reached


ans =

The residual is non-zero and therefore coin 12 cannot be reached


forces =

    1.0000
   -4.0000
    7.0000
   10.0000
 -140.0000
  925.0000
```

```
Current plot held
```



Published with MATLAB® R2014b