```
clear all
clc

% Load data from Excel files
data_1 = xlsread('FEM_6.xlsx', 1);
[ij] = size(data_1(:,1));
x1 = data_1(:,2);
y1 = data_1(:,3);
x2 = data_1(:,4);
y2 = data_1(:,5);
A = data_1(:,6);
E = data_1(:,7) * 10^3;
b_1 = data_1([1,2], [8, 9]);
b_1 = b_1';

data_2 = xlsread('FEM_6.xlsx', 2);
nx = data_2(:,2);
ny = data_2(:,3);

L = [];
cosine = [];
sine = [];

for k = 1:1
    plot([x1(k), x2(k)], [y1(k), y2(k)], 'k', 'linewidth', 1.5);
end

hold on

L(k) = (x2(k) - x1(k))^2 + (y2(k) - y1(k))^2;
L(k) = sqrt(L(k));
cosine(k) = (x2(k) - x1(k)) / L(k);
sine(k) = (y2(k) - y1(k)) / L(k);

scatter(nx, ny, '*', 'k')
xlim(b_1(1,:));
ylim(b_1(2,:));
plot([x1(1), x1(i)], [y1(1), y1(i)], 'k', 'linewidth', 1.5)

L = L * 1000;
r = 1;
k1 = E(r) * A(r) / L(r);
c = cosine(r);
s = sine(r);
k1 = k1 * [c^2, c*s, -c^2, -c*s; c*s, s^2, -c*s, -s^2; -c^2, -c*s, c*c, c*s; -c*s, -s^2, c*s, s*s];

r = 2;
k2 = E(r) * A(r) / L(r);
c = cosine(r);
s = sine(r);
k2 = k2 * [c^2, c*s, -c^2, -c*s; c*s, s^2, -c*s, -s^2; -c^2, -c*s, c*c, c*s; -c*s, -s^2, c*s, s*s];

k_1 = [k1, ones(4,2)];
k_1 = [k_1; ones(2,6)];
k_2 = [ones(4,2), k2];
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```
k_2 = [ones(2,6); k_2];

kg = k_1 + k_2;

syms q3 q4 F2x F2y

q1 = 0;
q2 = 0;
q5 = 0;
q6 = 0;

F1x = data_2(1,7);
F1y = data_2(1,8);
F2x = data_2(2,7);
F2y = data_2(2,8);
F3x = data_2(3,7);
F3y = data_2(3,8);

q = [q3, q4]';
F = [F2x, F2y]';
W = kg([3,4], [3, 4]) * q;
solution = solve(W);

q3 = double(solution.q3);
q4 = double(solution.q4);

% displacement matrix
q = [q1, q2, q3, q4, q5, q6];

% stress
cl = cosine(1);
sl = sine(1);
c2 = cosine(2);
s2 = sine(2);
sigma1 = E(1) / L(1) * [-cl, -sl, cl, sl] * [q1, q2, q3, q4]';
sigma2 = E(2) / L(2) * [-c2-s2, c2, s2] * [q5, q6, q3, q4]';

x = data_2(:,2);
y = data_2(:,3);
a = 40;

xlabel('x (m)')
ylabel('y(m)')

x_1 = x + [q1, q3, q5]' / a;
x_1 = [x_1; x_1(1)];
y_1 = y + [q2, q4, q6]' / a;
y_1 = [y_1; y_1(1)];

plot(x_1, y_1, '--', 'linewidth', 1.25)
title('Made By Iman')
```