

HW3 Problem 5 Comments & Solution

```
% Coments_HW3_Problem5.m
```

```
%%Comments:
```

```
%1, There is no need to define A and F as symbolic variables. Sine they are
% copmuted by symnolic variables, they automatically become symbolic.
```

```
% But put A,F in the syms list do no harm to the ptoqram.
```

```
%
```

```
%2. Do not use pi as a variable. This will take away the number 'pi' we
%needed in calculation of circle related geometrical data.
```

```
%
```

```
%3. How many point does this statement TH=[0.087266:1.48353] define ?
```

```
%
```

```
% There are many ways to define angles from 5 to 85 degrees
```

```
% e.g.,
```

```
% TH=linspace(5,85,100) * pi/180; % NOTE: we need pi here !!!
```

```
%
```

```
%4. WE have to substitute one symbolic variable at a time.
```

```
%Problem5 Original codes ( do not work)
```

```
syms th A p1 p2 p3 p4 p5 F % (1)
```

```
s=sin(th);
```

```
c=cos(th);
```

```
A=[c 1 0 0 0;0 s 0 0 1;0 0 2*s 0 0;0 -c c 1 0;0 s s 0 0]; % (1)
```

```
F=[0;0;1;0;0]; % (1)
```

```
p=[p1;p2;p3;p4;p5];
```

```
EQ=(A*p)-F
```

```
Ps=Solve(EQ(1),EQ(2),EQ(3),EQ(4),EQ(5),p1,p2,p3,p4,p5)
```

```
pi=[Ps.p1;Ps.p2;Ps.p3;Ps.p4;Ps.p5] % (2)
```

```
%theta: 5-85 degrees
```

```
TH=[0.087266:1.48353] % (3)
```

```
PI=SUBS(pi,th,TH) % (4)
```

```
figure
```

```
plot(TH,PI)
```

Do Not Work

```
%Problem5 Corrected codes (Assuming the data are correct)
```

```
syms th p1 p2 p3 p4 p5 % (1)
```

```
s=sin(th);
```

```
c=cos(th);
```

```
A=[c 1 0 0 0;0 s 0 0 1;0 0 2*s 0 0;0 -c c 1 0;0 s s 0 0]; % (1)
```

```
F=[0;0;1;0;0]; % (1)
```

```
p=[p1;p2;p3;p4;p5];
```

```
EQ=(A*p)-F
```

```
Ps=Solve(EQ(1),EQ(2),EQ(3),EQ(4),EQ(5),p1,p2,p3,p4,p5)
```

```
pth=[Ps.p1;Ps.p2;Ps.p3;Ps.p4;Ps.p5] % (2)
```

```
%theta: 5-85 degrees
```

```
TH=linspace(5,85,100) * pi/180; % NOTE: we need pi here !!! % (3)
```

```
%% Plot P1
```

```
i=1;
```

```
PTH=SUBS(pth(i),th,TH); % (4)
```

```
figure
```

```
plot(TH,PTH)
```

```
%%%%%%%%%%%% Use a loop to plot all forces
```

```
%% Note that the following codes have problrm with P5, since it it a
```

→ (b)

```
%% constant
```

```
figure
```

```
hold on
```

```
for i=1:5;
```

```
PTH=SUBS(pth(i),th,TH);
```

```
% (4)
```

```
plot(TH,PTH)
```

```
end
```

→ Produce Figure A

```
%% Correction of the above bug
```

```
THd=TH*180/pi;
```

```
figure
```

```
hold on
```

```
for i=1:5;
```

```
PTH=SUBS(pth(i),th,TH); % (4)
```

```
if length(PTH)==1;
```

```
    PTH=PTH*(THd.^0);
```

```
end
```

```
    plot(THd,PTH)
```

```
    text(THd(5+10*i),PTH(5+10*i),['\bfP_',int2str(i)])
```

```
end
```

```
xlabel('\bfAngle(degrees)')
```

```
ylabel('\bfTruss member force')
```

```
title('\bfTruss member forces vs Angle(degrees)')
```

```
grid on
```

→ Produce labels on figures

→ Produce Figure B

```
%% Alternative Solution of a system of linear equations
```

```
P=inv(A)*F (a)
```

```
P = (a)
```

```
1/2/cos(th)/sin(th)
```

```
-1/2/sin(th)
```

```
1/2/sin(th)
```

```
-cos(th)/sin(th)
```

```
1/2
```

```
pth = (b)
```

```
1/2/cos(th)/sin(th)
```

```
-1/2/sin(th)
```

```
1/2/sin(th)
```

```
-cos(th)/sin(th)
```

```
1/2
```

```
ccheck=P-ptb
```

```
= 0
```

```
0
```

```
0
```

```
0
```

```
0
```

* These are the locations
to put the text
(problem dependent)

Figure A

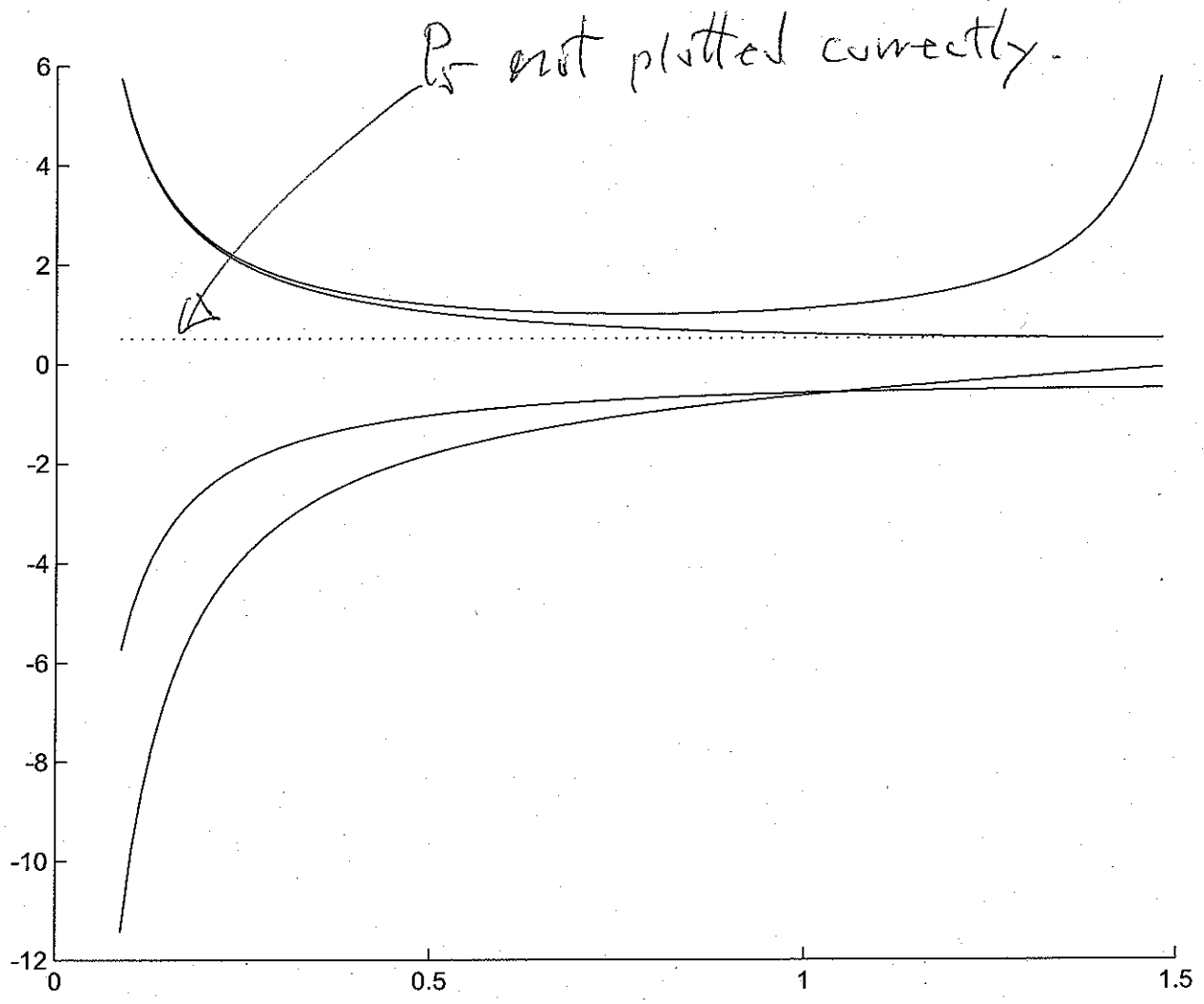


Figure B