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# Homework 5, ME3215 Spring 2022

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## HW5\_2 Temperature distribution on a plate

```
clear;clc;close all

E1=80; E2=120; E3=60;

A = [4 -1 0 0 0 -1;
     -1 4 -1 0 -1 0;
     0 -1 4 -1 0 0;
     0 0 -1 4 -1 0;
     0 -1 0 -1 4 -1;
     -1 0 0 0 -1 4];

b = [E1+E2; E1; E1+E3; E1+E3; E1; E1+E2];

T=A\b;

for i=1:6
    fprintf('The temperature at the inner node T%d = %5.4f degrees\n',i,T(i))
end

The temperature at the inner node T1 = 94.2857 degrees
The temperature at the inner node T2 = 82.8571 degrees
The temperature at the inner node T3 = 74.2857 degrees
The temperature at the inner node T4 = 74.2857 degrees
The temperature at the inner node T5 = 82.8571 degrees
The temperature at the inner node T6 = 94.2857 degrees
```

## HW5\_3: Displacement of three carts

```
clear;clc;close all

%define the spring constants N/m
k=[25 25 25 10 5 10 2 2];
P1=2; P2=2; P3=2;
%define the cart forces, N
P = [P1; P2; P3];

%coefficient matrix
A = [k(1)+k(5)+k(4) -k(4) -k(5);
     -k(4) k(2)+k(4)+k(6) -k(6);
```

```
-k(5) -k(6) k(7)+k(8)+k(3)+k(6)+k(5)];
b=P;
u = A\b;

%plugging back in to verify, all = 0
P(1) - k(1)*u(1)+k(5)*(u(3)-u(1))+k(4)*(u(2)-u(1))
P(2) - k(2)*u(2) - k(4)*(u(2)-u(1))+k(6)*(u(3)-u(2))
P(3) - k(7)*u(3) - k(8)*u(3) - k(3)*u(3) - k(6)*(u(3)-u(2)) -
      k(5)*(u(3)-u(1))

ans =

-1.1102e-16

ans =

2.2204e-16

ans =

-3.3307e-16

%print the results
for i = 1:3
    fprintf('Displacement of cart #%d = %5.4f meters\n',i,u(i))
end

Displacement of cart #1 = 0.0785 meters
Displacement of cart #2 = 0.0779 meters
Displacement of cart #3 = 0.0721 meters
```

*Published with MATLAB® R2020a*