

MATLAB HOMEWORK 2

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GE 1502 -- 308 Hurtig Hall

10:30 - 11:35am

Professor Whalen

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Thermal efficiency of a straight rectangular finned surface

m-file

%tension vs distance

L = 10; %10 mm

t = 0.1; %0.1 mm

Lc = L + (2*t); %constant function

i = 1; %counter loop initializing variable

for n=0.1 : 0.1 : 1 %for loop for incrementation

 nfin(i) = tanh(n*Lc) / (n*Lc) ; %function

 m(i)=n; %make m a vector

 i = i+1;

end

%results

FID = fopen('fin_efficiency.txt', 'w'); %file pointer, permission write

fprintf(FID, 'thickness domain\n'); %header

fprintf(FID, '%4.4f\t', m); %values, and repeat process

fprintf(FID, '\n\nefficiency values\n');

fprintf(FID, '%4.4f\t', nfin);

%plot

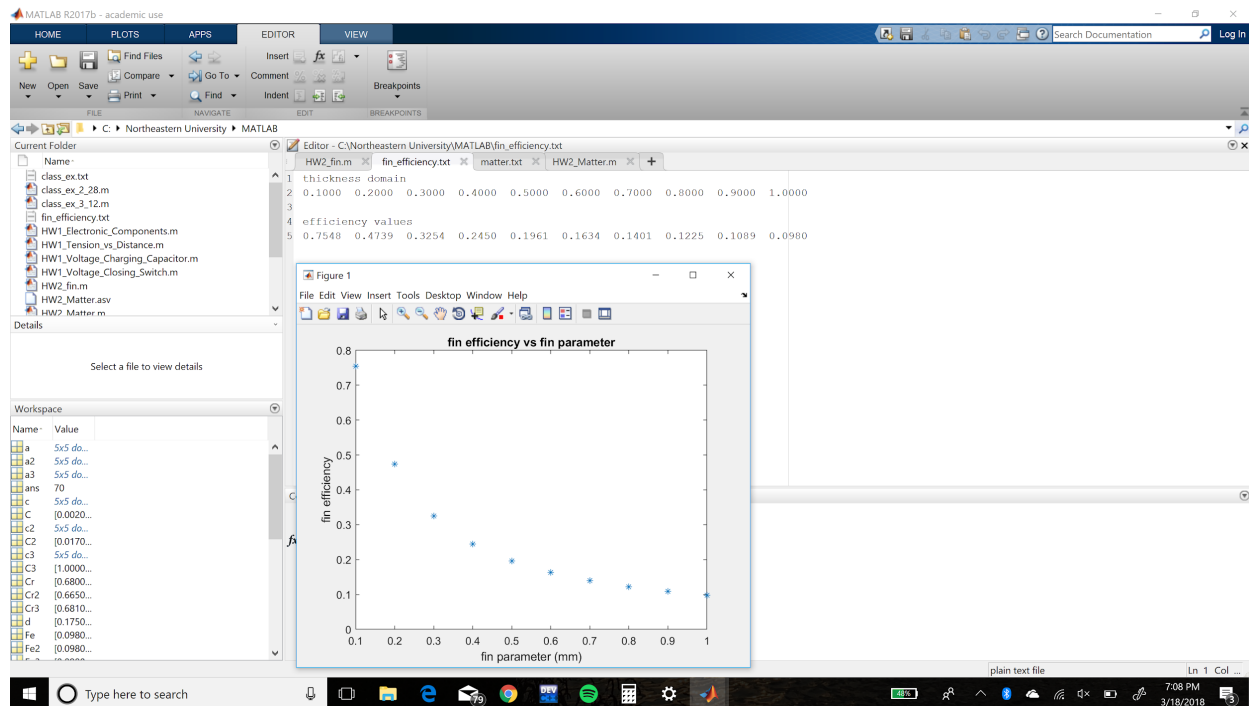
plot(m, nfin, '*'); %plot function with points only

xlabel('fin parameter (mm)');

ylabel('fin efficiency');

title('fin efficiency vs fin parameter');

plot window and txt file results



Law of the Conservation of Matter

m-file

%composition of parts

Cr = [0.68, 0.75, 0, 0, 0];

Ni = [0.2, 0, 0.998, 0, 0];

Mn = [0.02, 0.001, 0.001, 0.001, 0];

C = [0.002, 0.02, 0, 0.001, 0.999];

Fe = [0.098, 0.229, 0.001, 0.998, 0.001];

%a, d

a = [Cr; Ni; Mn; C; Fe]; %from equations

d = [0.175, 0.085, 0.005, 0.002, 0.733]'; %from equations

c = inv(a); %a^-1

%exercice 1

%solution, multiply by 100 to convert the percentages

j1a = (a\d*100);

```
j1b = (100* c*d);
```

```
%print results
```

```
FID = fopen('matter.txt', 'w'); %create file pointer with permission write  
fprintf(FID, 'Exercise 1\nMatrix [A]\n'); %create header  
fprintf(FID, '%4.4ft%4.4ft%4.4ft%4.4ft%4.4f\n', a); %4 decmial places  
fprintf(FID, '\nInverse Matrix [A]^-1\n'); %repeat process, and so on...  
fprintf(FID, '%4.4ft%4.4ft%4.4ft%4.4ft%4.4f\n', c);  
fprintf(FID, '\nSolution using [A] \ [d] * 100\n');  
fprintf(FID, '%4.4ft%4.4ft%4.4ft%4.4ft%4.4f\n', j1a);  
fprintf(FID, '\nSolution using [A]^-1 * [d] * 100\n');  
fprintf(FID, '%4.4ft%4.4ft%4.4ft%4.4ft%4.4f\n', j1b);
```

```
%exercise 2 -- label variables correspondingly
```

```
Cr2 = [0.665, 0.74 , 0, 0, 0];  
Ni2 = [0.2, 0, 0.998, 0, 0];  
Mn2 = [0.02, 0.001, 0.001, 0.001, 0];  
C2 = [0.017, 0.03, 0, 0.001, 0.999];  
Fe2 = [.098, 0.229, 0.001, 0.998, 0.001];
```

```
a2 = [Cr2; Ni2; Mn2; C2; Fe2];  
c2 = inv(a2);
```

```
%solution
```

```
j2a = (a2\d*100);  
j2b = (100*c2*d);
```

```
fprintf(FID, '\nExercise 2\nMatrix [A]\n');  
fprintf(FID, '%4.4ft%4.4ft%4.4ft%4.4ft%4.4f\n', a2);  
fprintf(FID, '\nInverse Matrix [A]^-1\n');  
fprintf(FID, '%4.4ft%4.4ft%4.4ft%4.4ft%4.4f\n', c2);  
fprintf(FID, '\nSolution using [A] \ [d] * 100\n');  
fprintf(FID, '%4.4ft%4.4ft%4.4ft%4.4ft%4.4f\n', j2a);  
fprintf(FID, '\nSolution using [A]^-1 * [d] * 100\n');  
fprintf(FID, '%4.4ft%4.4ft%4.4ft%4.4ft%4.4f\n', j2b);
```

```
%exercise 3
```

```
Cr3 = [0.681, 0.745 , 0, 0, 0];  
Ni3 = [0.2, 0, 0.998, 0, 0];  
Mn3 = [0.02, 0.001, 0.001, 0.001, 0];  
C3 = [0.001, 0.025, 0, 0.001, 0.999];
```

```
Fe3 = [.098, 0.229, 0.001, 0.998, 0.001];
```

```
a3 = [Cr3; Ni3; Mn3; C3; Fe3];
```

```
c3 = inv(a3);
```

```
j3a = (a3\d*100);
```

```
j3b = (100*c3*d);
```

```
fprintf(FID, '\nExercise 3\nMatrix [A]\n');
```

```
fprintf(FID, '%4.4ft%4.4ft%4.4ft%4.4ft%4.4f\n', a3);
```

```
fprintf(FID, '\nInverse Matrix [A]^-1\n');
```

```
fprintf(FID, '%4.4ft%4.4ft%4.4ft%4.4ft%4.4f\n', c3);
```

```
fprintf(FID, '\nSolution using [A] \ [d] * 100\n');
```

```
fprintf(FID, '%4.4ft%4.4ft%4.4ft%4.4ft%4.4f\n', j3a);
```

```
fprintf(FID, '\nSolution using [A]^-1 * [d] * 100\n');
```

```
fprintf(FID, '%4.4ft%4.4ft%4.4ft%4.4ft%4.4f\n', j3b);
```

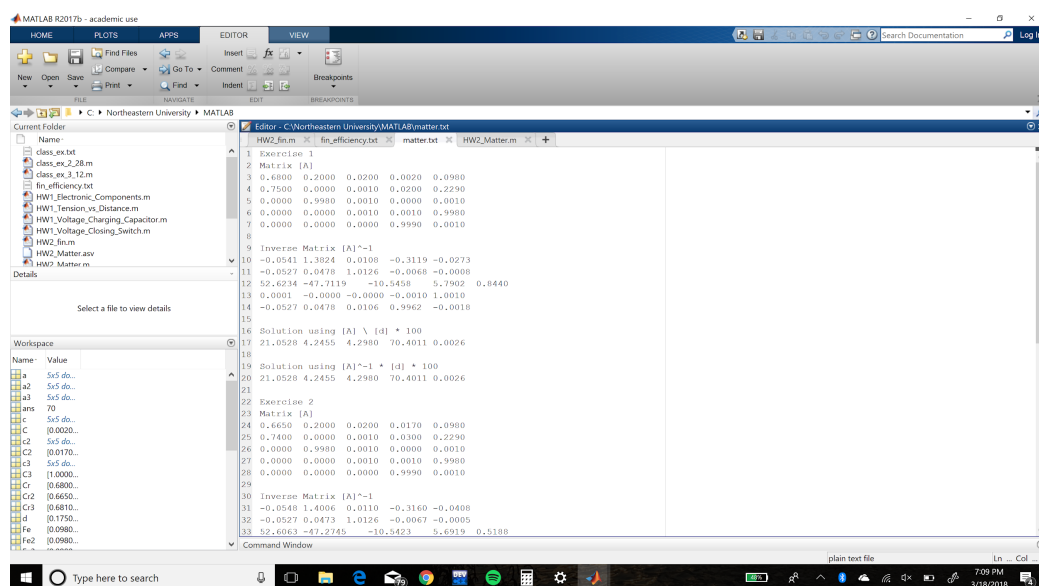
```
%results and my conclusion
```

```
fprintf(FID, '\nBased on the results from Vendor A and Vendor B (Exercise 2 and 3 respectively, I would purchase from Vendor B.);
```

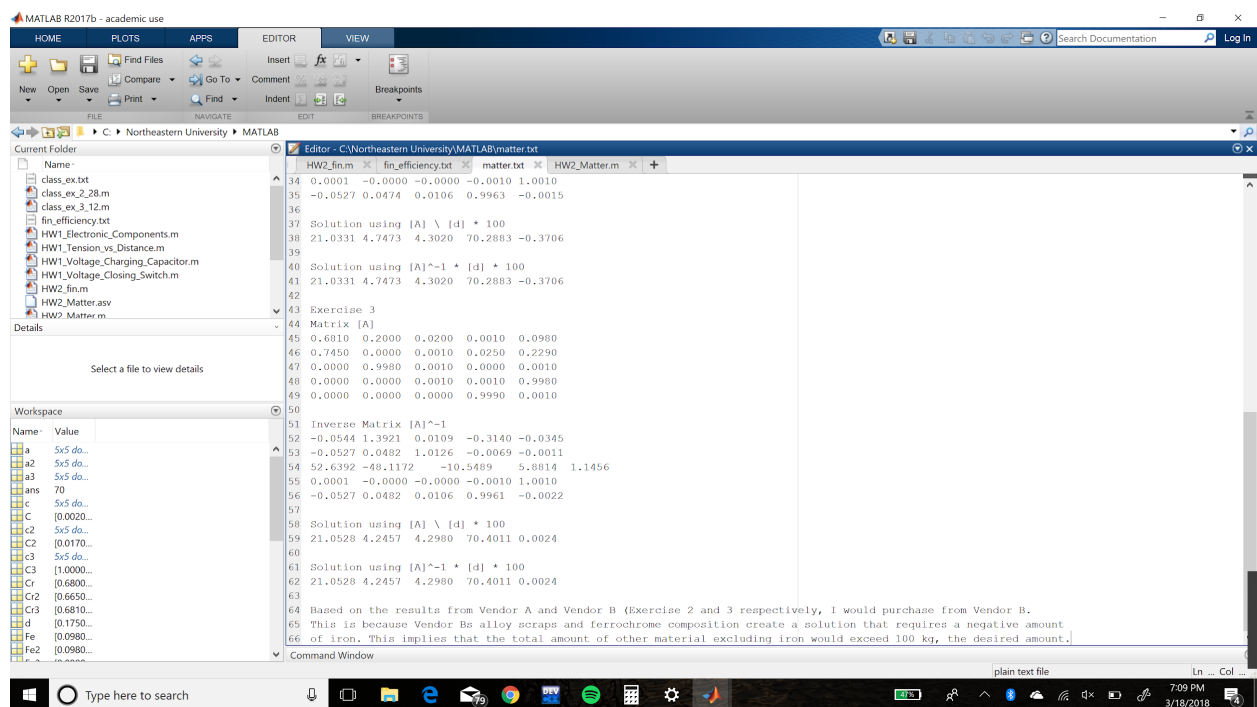
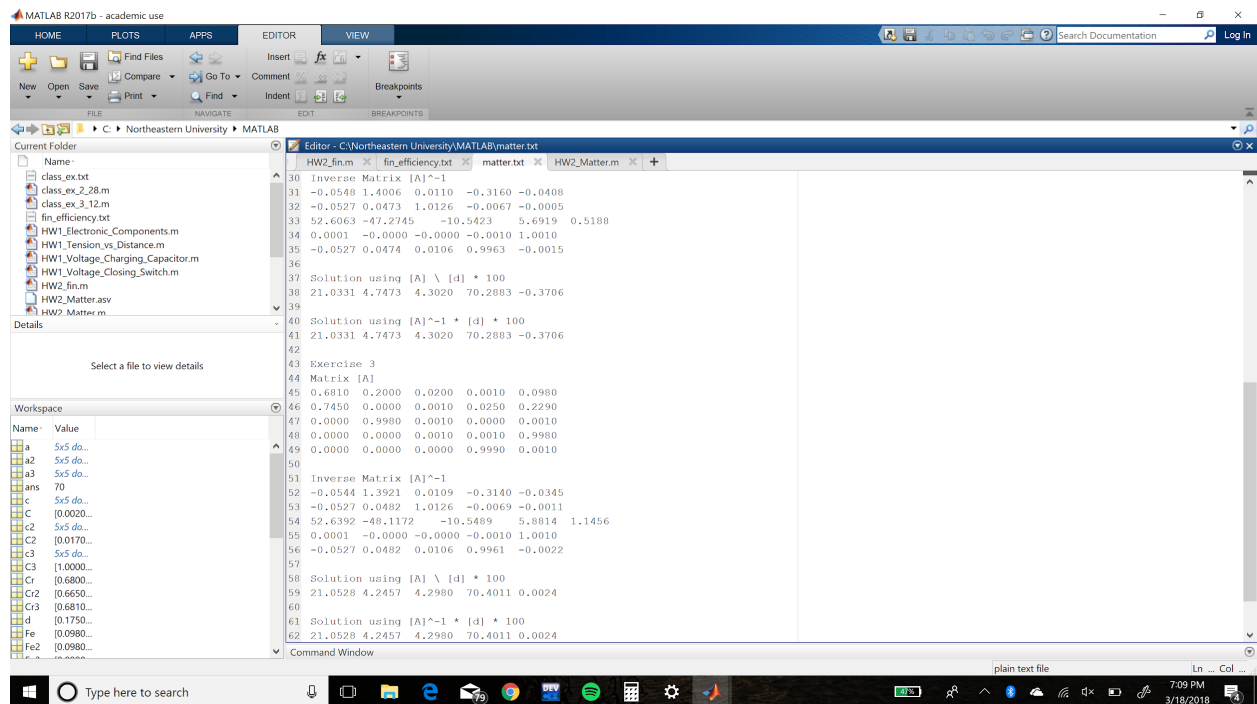
```
fprintf(FID, '\nThis is because Vendor Bs alloy scraps and ferrochrome composition create a solution that requires a negative amount');
```

```
fprintf(FID, '\nof iron. This implies that the total amount of other material excluding iron would exceed 100 kg, the desired amount.');
```

txt.file results



```
HW2_fm.m  fin_efficiency.txt  matter.txt  HW2_Matter.m
1 Exercise 1
2 Matrix [A]
3 0.4000 0.2000 0.0200 0.0020 0.0980
4 0.7500 0.0000 0.0010 0.0200 0.2290
5 0.0000 0.9980 0.0010 0.0000 0.0010
6 0.0000 0.0000 0.0010 0.0010 0.9980
7 0.0000 0.0000 0.0000 0.9990 0.0010
8
9 Inverse Matrix [A]^-1
10 -0.0541 1.3024 0.0108 -0.3119 -0.0273
11 -0.0527 0.0478 1.0126 -0.0068 -0.0008
12 52.6234 -47.7119 -10.5458 5.7902 0.8440
13 0.0001 -0.0000 -0.0000 -0.0010 1.0010
14 -0.0527 0.0478 0.0106 0.9962 -0.0018
15
16 Solution using [A] \ [d] * 100
17 21.0528 4.2455 4.2980 70.4011 0.0026
18
19 Solution using [A]^-1 * [d] * 100
20 21.0528 4.2455 4.2980 70.4011 0.0026
21
22 Exercise 2
23 Matrix [A]
24 0.6650 0.2000 0.0200 0.0170 0.0980
25 0.7400 0.0000 0.0010 0.0300 0.2290
26 0.0000 0.9980 0.0010 0.0000 0.0010
27 0.0000 0.0000 0.0010 0.0010 0.9980
28 0.0000 0.0000 0.0000 0.9990 0.0010
29
30 Inverse Matrix [A]^-1
31 -0.0548 1.4006 0.0110 -0.3160 -0.0408
32 -0.0527 0.0473 1.0126 -0.0067 -0.0005
33 52.6013 -47.2745 -10.5423 5.6919 0.5188
```



Business-Style Letter

(see attached file)