Contents

- Preperation of the workspace
- Problem 2
- Problem 4


```
%{

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Description:
AME 70634: Flow Control
Homework: 2
Due: 10/7/2024


%}
```
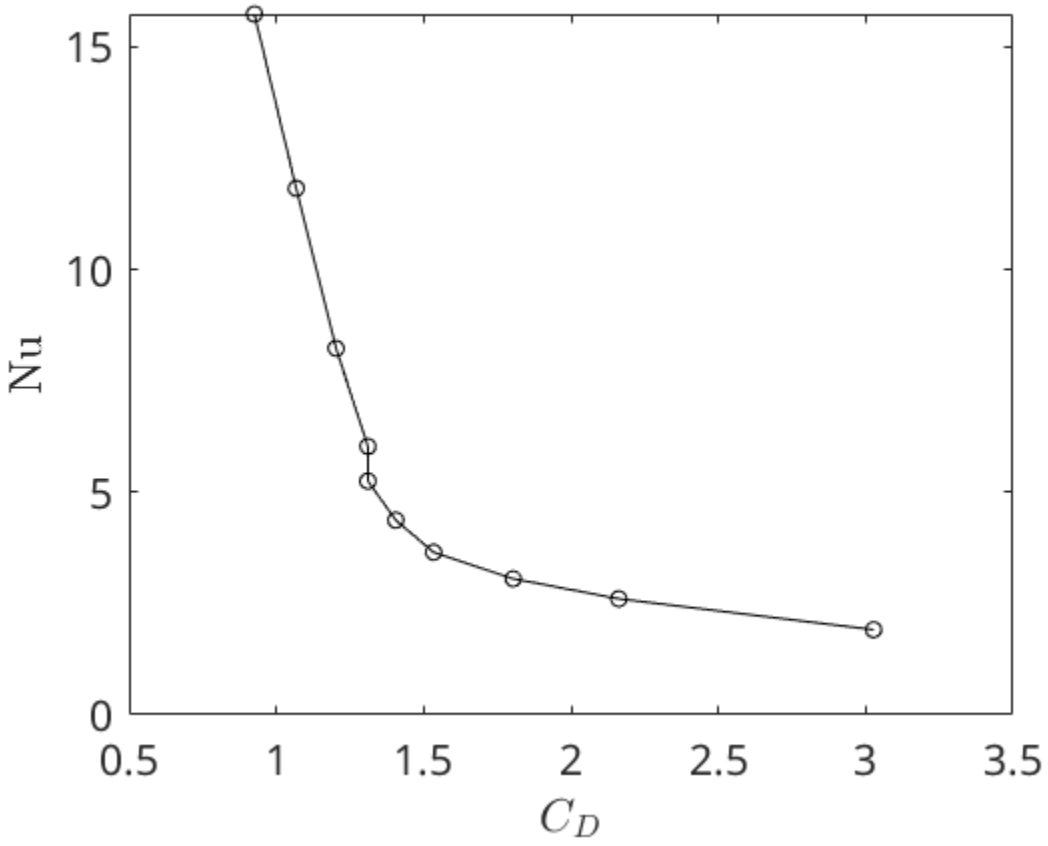

Preperation of the workspace

```
fontsize = 16;


% set(0,'DefaultFigureWindowStyle','docked')
set(0,'DefaultTextInterpreter','latex')
set(0,'DefaultAxesFontSize',fontsize)
set(0,'DefaultLegendFontSize',fontsize)
colors  = ["#000000","#1b9e77","#d95f02","#7570b3","#0099FF"];
```

Problem 2

```
Pr = 0.71;
C1 = 0.3;
C2 = (0.62 * Pr^(1/3)) / (1+(0.4/Pr)^(2/3))^(1/4);

Cd = [11.024348691549282, 3.027027027027027;
22.539339047347912, 2.1621621621621623;
32.22814389988288, 1.8040540540540542;
47.60439595420854, 1.5337837837837838;
70.3167554794647, 1.4054054054054055;
103.86532592315581, 1.310810810810811;
139.16480383601055, 1.310810810810811;
266.6136330715482, 1.2027027027027029;
563.1035111041316, 1.0675675675675675;
1010.894613309757, 0.9256756756756758];

Nu = C1+C2.*(Cd(:,1).^(0.5));

figure
plot(Cd(:,2),Nu,"ko-")
```

```
xlabel("$C_D$")
ylabel("Nu")
```

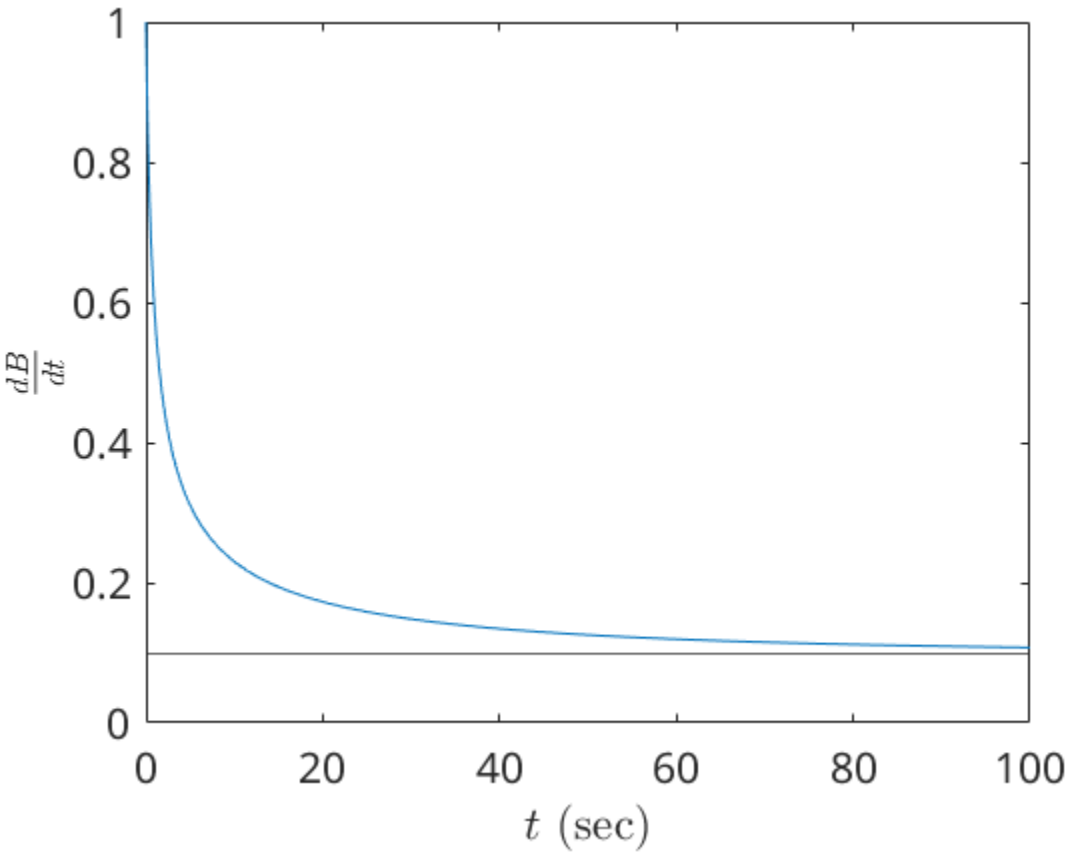


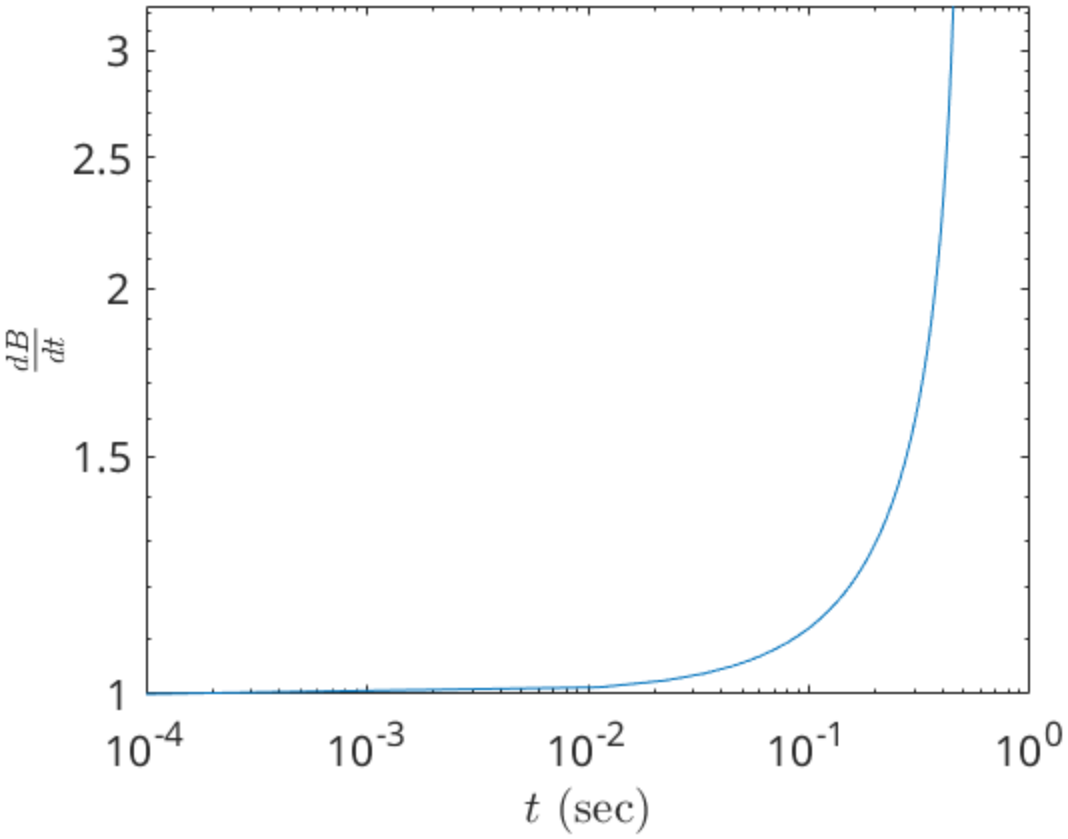
Problem 4

c1 & c2 positive

```
Re_crit = 0.01;
c1 = 1;
c2 = 1;
[t,dB] = ode45(@(t,B) c1*(Re_crit)*B - c2*abs(B)^2*B, [0.0001,100], 1);


figure
plot(t,dB)
yline(0.1)
ylim([0,1])
xlabel("$t$ (sec)")
ylabel("$\frac{dB}{dt}$")

% positive c1 -c2

c1 = 1;
c2 = -1;
[t,dB] = ode45(@(t,B) c1*(Re_crit)*B - c2*abs(B)^2*B, [0.0001,0.45], 1);
```

```
figure
loglog(t,dB)
xlabel("$t$ (sec)")
ylabel("$\frac{dB}{dt}$")
```





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