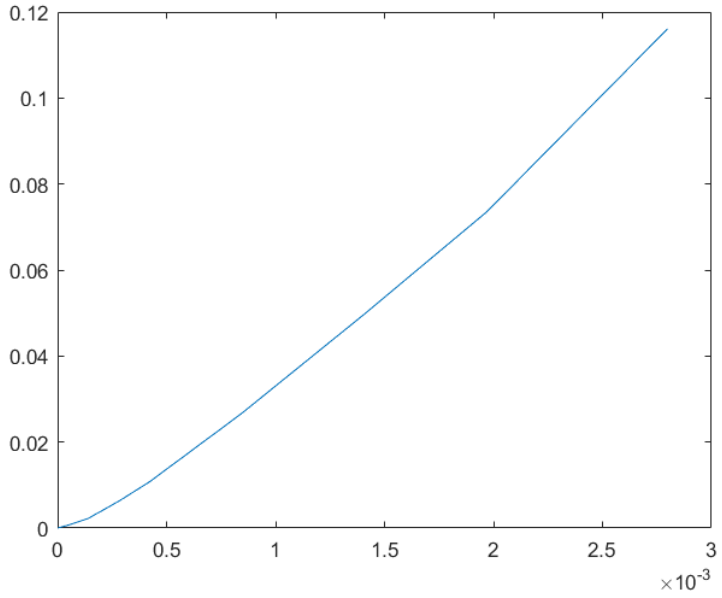
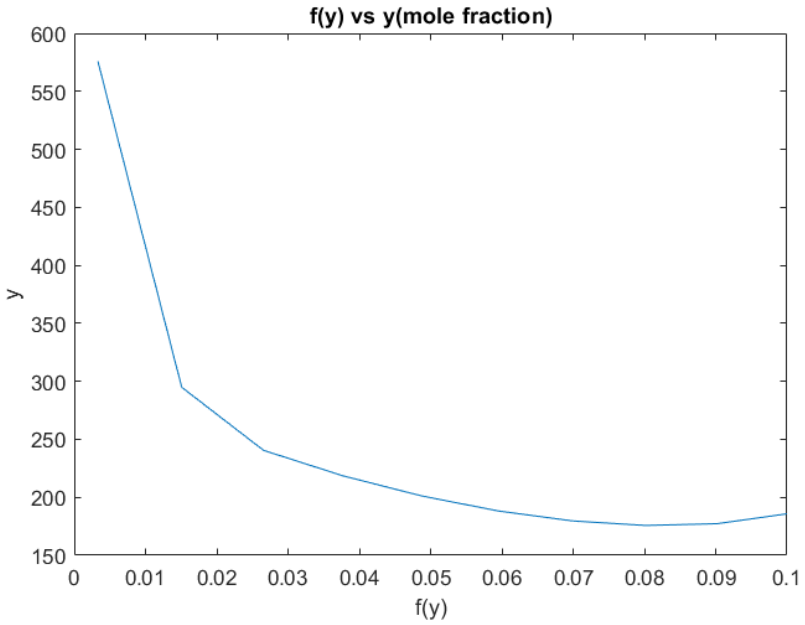
Question 1: Code + Graphs

Equilibrium curve(X vs Y)



F(y) vs y

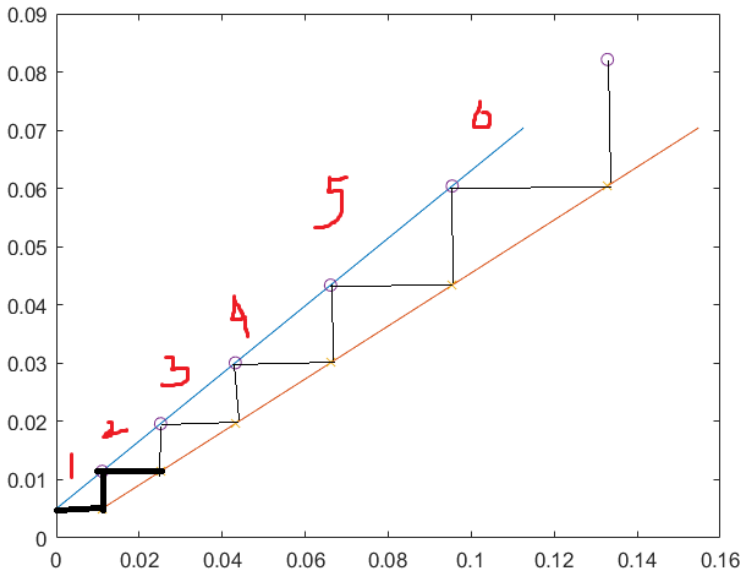



```
clear; close all;
yentry = 0.1;
Yentry = yentry/(1-yentry);
xentry = 0;
yexit = 0.03*0.1/(0.03*0.1+0.9);
Yexit = yexit/(1-yexit);
mw = 0.1*64+0.9*29;
Vs = 1500/mw*0.9;
xeqbm = [0 0.562 1.403 2.8 4.22 8.42 14.03 19.65 27.9]*10^(-4);
yeqbm = [0 0.792 2.23 6.19 10.65 25.9 47.3 68.5 104]*(10^(-3));
```

```
xy = spline(yeqbm,xeqbm);
%part a
Xeqbm = xeqbm./(1-xeqbm);
Yeqbm = yeqbm./(1-yeqbm);
figure(1);
title('EqbmPlot')
xlabel('Xeqbm')
ylabel('Yeqbm')
plot(Xeqbm,Yeqbm);
XY = spline(Yeqbm,Xeqbm);
Xexit = ppval(XY,Yentry);
Lsmin = Vs*(Yentry-Yexit)/(Xexit);
%Part b
kx=1.25;
ky=0.075;
cs = 0.781;
Ls = 1.25*Lsmin;
%operating line in terms of mole ratio
OL = @(val)(Vs/Ls).*(val - Yexit);
%n points on operating line
n = 10;
Y = linspace(Yexit,Yentry,n);
X = OL(Y);
x = X./(1+X);
y = Y./(1+Y);
%From n points, draw lines of slope -kx/ky and find intersection at eqbm
%curve. Substitute Xi in terms of the line equation & curve equation,
%equate them and set to zero
func = @(yi)(-ky/kx*(yi-y)+x) - ppval(xy,yi);
yi = fsolve(func,zeros(1,n));
%Value of function to be integrated
f = (1+Y)./((y-yi).*(1-y));
%Integrate yis using trapezoidal rule
AUC = trapz(y,f);
H = AUC*(Vs/(cs*3600*ky));
figure(2);
title('f(y) vs y(mole fraction)')
xlabel('y')
ylabel('f(y)')
plot(y,f)
```

Question 2: Code + Graphs

```
clear; close all;
Ventry = 0.4*1.013*10^5/8.314/297;
yentry = 50/760;
xentry=0;
Vs = (1-yentry)*Ventry;
Yentry = yentry/(1-yentry);
yexit = 0.005;
Yexit = yexit/(1-yexit);
xeqbm = @(y)(760/346*y);
xexit = xeqbm(yentry);
Xexit = xexit/(1-xexit);
Lsmin = Vs*(Yentry-Yexit)/(Xexit);
Ratiomin = (Yentry-Yexit)/(Xexit);
Ls = 1.5*Lsmin*180/1000*3600;
m = 1.5*Ratiomin;
y = Yexit;
i = 0;
xcoords = zeros(1,6);
ycoords = zeros(1,6);
ycoords2 = ycoords;
while y <= Yentry
   i = i + 1;
   x = (y)/0.455;
   xcoords(i) = x;
   ycoords(i) = y;
   y = Yexit + m*(x);
   ycoords2(i) = y;
end
ypoints = linspace(Yentry,Yexit,10);
OL = 1/m.*(ypoints-Yexit);
Eqbm = ypoints/0.455;
figure();
plot(OL,ypoints,Eqbm,ypoints,xcoords,ycoords,'x',xcoords,ycoords2,'o');
%Kremser's method
K = 346/760;
A = m/(K);
N = log((yentry-K*xentry)/(yexit-K*xentry)*(1-1/A)+1/A)/log(A);
%efficiency
mu = 2*10^(-3);
pho = 0.81*1000;
abs = mu*0.455*180/pho;
Eo = 0.25;
N_actual = N/Eo;
```


0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
1
2
3
4
5
6