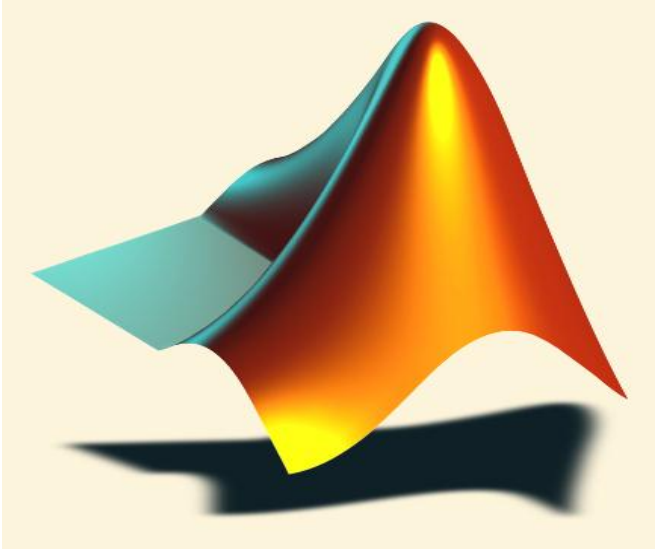
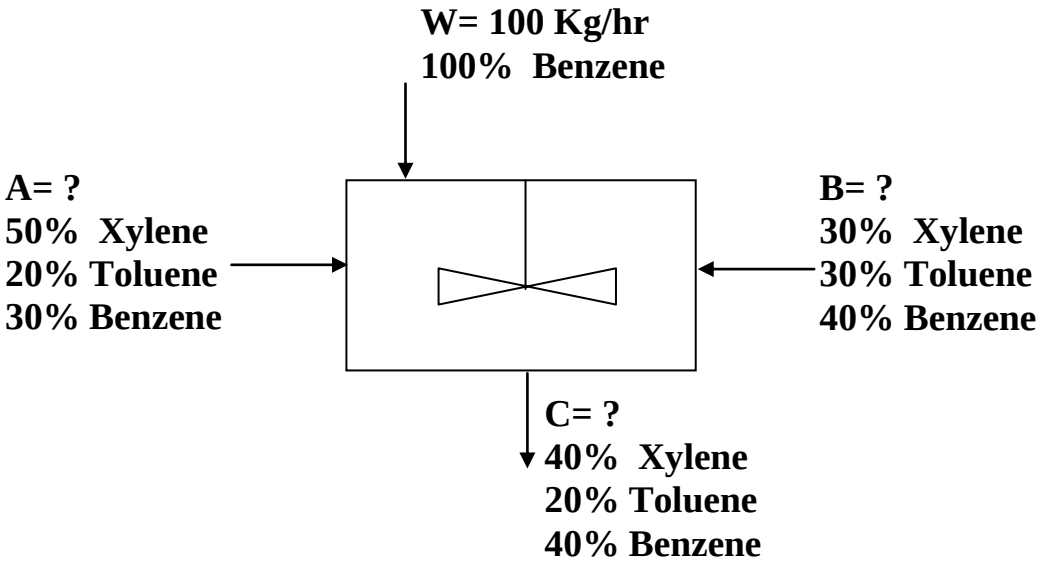
Al-Mustaqbal University College
Chemical Engineering and Petroleum Industries department



Exercise

Exercise 1:

For the mixer shown below write a code to find the values of streams A, B and C?



Solution: By making component material balance on each component within the mixer you can reach to a system of three equations which can be solve by using the command solve to find the unknowns A, B, C.

Type the following command:

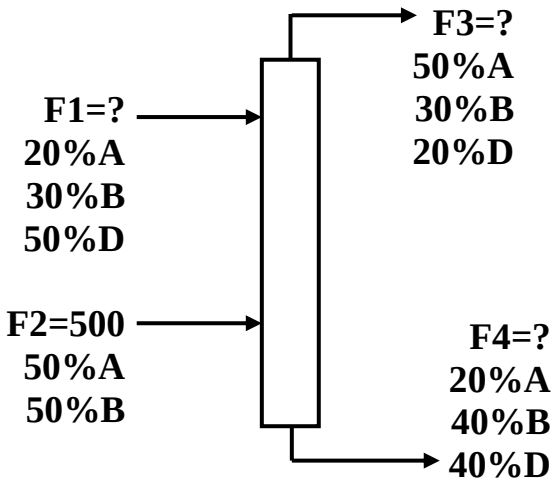
[A,B,C]=solve('.5*A+.3*B=.4*C','.2*A+.3*B=.2*C','.3*A+.4*B+100=.4*C')

The results will be:

```
A =
   600
B =
   200
C =
   900
```

Exercise 2:

For the following distillation column calculate the values of F1, F3 and F4?



solution:

[F1,F3,F4]=solve('.2*F1+250=.5*F3+.2*F4','.3*F1+250=.3*F3+.4*F4','.5*F1=.2*F3+.4*F4')

The results will be:

```
F1=
    1000
 F3=
    500
 F4 =
   1000
```

Exercise 3:

Calculate the heat required to increase the temperature of 1 mol of methane from 533.15 K to 873.15 C at a pressure approximately 1 bar. where

$$\frac{Cp}{R} = A + BT + CT^2 + DT^{-2}$$

A=1.702 , B=9.081*10^{-3} , C=-2.164*10^{-6} , D=0

R=8.314

and

$$Q = n \int_{Tin}^{Tout} Cp\,dt$$

Solution:

```
syms T;
T1=533.15;
T2=873.15;
A=1.702;
B=9.081e-3;
C=-2.164e-6;
R=8.314;
Cp=(A+B*T+C*T^2);
Q=R*int(Cp,T1,T2)
```

The results will be:

```
Q =
  1.9778e+004
```

Exercise 4:

Evaluate the following double integral

$$\int_0^{\pi} \int_0^{\sin x} (x^2 + y^2)\,dy \cdot dx$$

Solution:

MATLAB can also do multiple integrals. The following command computes the double integral:

```
syms x y;
int(int(x^2 + y^2, y, 0, sin(x)), 0, pi)
ans =
-32/9+pi^2
```

To convert the way of the result displaying, type the code:

```
single(-32/9+pi^2)
ans =
   6.3140
```

Practice problems:

1. Factor $x^3+3x^2y+3xy^2+y^3$.
2. Simplify $(x^3-8)/(x-2)$.
3. Expand $(x^2+1)(x-5)(2x+3)$.
4. Solve $\sin x = 2-x$ for x.
5. Solve $5x+2y+4z = 8$, $-3x+y+2z = -7$, $2x+y+z = 3$ for x, y and z.
6. Solve $y^2-5xy-y+6x^2+x = 2$ for x.
7. Find the first derivative of the function $(\sin x/(\ln(x^2+1))-e^x$ and evaluate it at x=3.
8. Find the 12th derivative of the function $(x/2+1)^{65}$
9. Find the first and second partial derivatives of the function $e^{x2}\sin xy$