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Problem 1

```
%Program to estimate K and Km in rate expression for Enzymatic Reaction
clc
clear all
close all

% r=KS/(Km+S)

S=[1.233;0.540;0.442;0.258;0.198;0.162;0.130;0.128]
r=[5.970;3.319;2.253;2.547;1.493;1.182;1.095;0.869]
x=1./S; % x=1/S
y=1./r; % y=1/r

% Writing in the form y=a1+a0x
% y=(Km/K)*x+(1/K)

% A =[1,x]
A(:,2)=x;
A(:,1)=1;

% Aa=y where a=[(1/K);(Km/K)]

a=A\y;

K=1/a(1)
Km=K*a(2)

% Writing in the form x=b1y+b0
% x=(K/Km)*y-(1/Km)

% B =[1,y]
B(:,2)=y;
B(:,1)=1;

% Bb=x where b=[(-1/Km);(K/Km)]

b=B\x;

Km=-1/b(1)
K=Km*b(2)
```

```
S =
```

```
    1.2330
    0.5400
    0.4420
    0.2580
    0.1980
    0.1620
    0.1300
    0.1280


r =

    5.9700
    3.3190
    2.2530
    2.5470
    1.4930
    1.1820
    1.0950
    0.8690


K =

   14.7896


Km =

    1.8083


Km =

    5.1733


K =

   39.2633
```

Problem 2

```
%program to solve two equations in two variables
clc;
close all;
clear all;

X=[1,1];              %using initial values of (x,y)=(1,1)
a=fsolve(@Fun2,X);    %Solving two equations defined in Fun2 to obtain the solutio
x = a(1)              %Final value of x
y = a(2)              %Final value of y
```

```
Equation solved.

fsolve completed because the vector of function values is near zero
as measured by the default value of the function tolerance, and
the problem appears regular as measured by the gradient.



x =

    1.2008


y =

   -2.1302
```

Problem 3

Finding friction factor for turbulent flow in a smooth pipe given Reynold's number.

```
clc
clear all
close all

% Using iteration
Re=100000
fin=0.01; % Initial value of f
f=0.01;
while(abs(f-fin)<0.00001)
    fin=f;
    f=(1/(-0.4+sqrt(3)*log(Re*sqrt(f))))^2;
    f=f+0.00001;
end
    f

    % Solving using fsolve

    X=0.01;
    g = @(X)fun(X,Re); % Modified function which can accept parameter Re
    f=fsolve(g,X)

    % Solving for different values of Re using fsolve
    Re=(4000:10^5:10^6);
    for(i=1:10)
        g = @(X)fun(X,Re(i));
    F(i)=fsolve(g,X);
    end

 Re=4000:10^5:10^6
```

```
F
  loglog(Re,F);
  xlabel('log(Reynolds Number)')
  ylabel('log(Friction factor)')
```

```
Re =

      100000


f =

    0.0041


Equation solved.

fsolve completed because the vector of function values is near zero
as measured by the default value of the function tolerance, and
the problem appears regular as measured by the gradient.



f =

    0.0045


Equation solved.

fsolve completed because the vector of function values is near zero
as measured by the default value of the function tolerance, and
the problem appears regular as measured by the gradient.



Equation solved.

fsolve completed because the vector of function values is near zero
as measured by the default value of the function tolerance, and
the problem appears regular as measured by the gradient.



Equation solved.

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```
Equation solved.

fsolve completed because the vector of function values is near zero
as measured by the default value of the function tolerance, and
the problem appears regular as measured by the gradient.



Re =

  Columns 1 through 6

       4000      104000      204000      304000      404000      504000

  Columns 7 through 10

     604000      704000      804000      904000

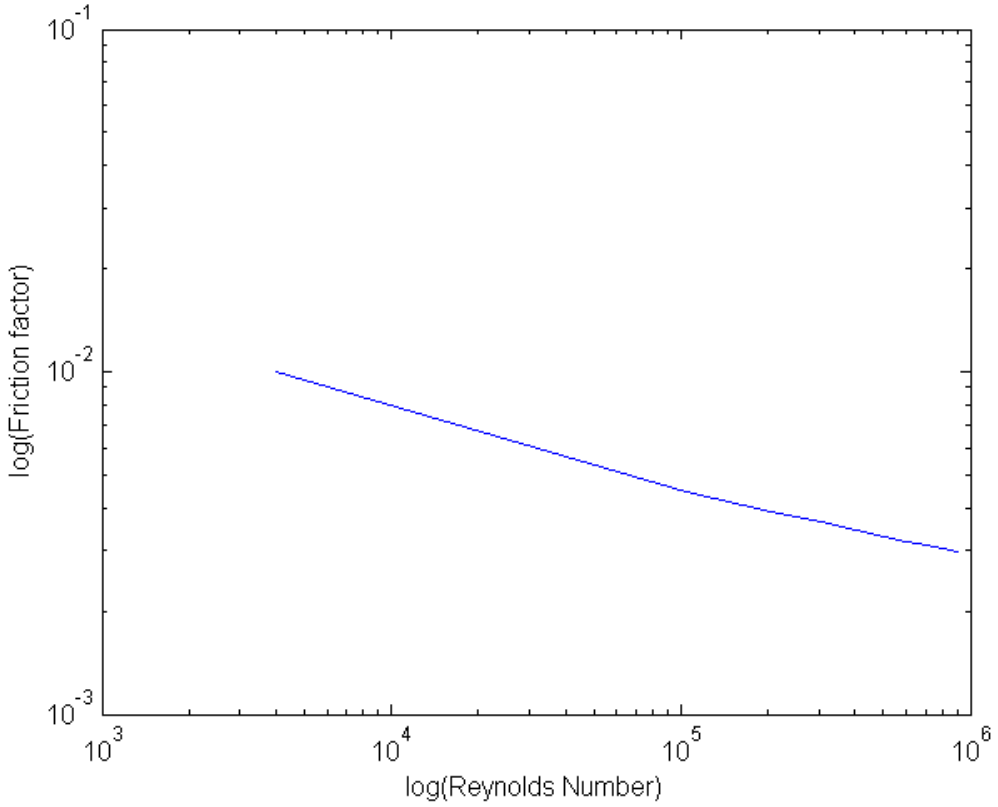

F =

  Columns 1 through 7

    0.0100    0.0045    0.0039    0.0036    0.0034    0.0033    0.0032

  Columns 8 through 10

    0.0031    0.0030    0.0030
```



Problem 4

```
% Program to Obtain the steady state fully developed flow profile for the liquid f

clc;
clear all;
close all;
mu = 0.001;        %viscocity of liquid in Kg/m.s
L = 0.2;           %length of a pipe in meter
R = 0.025;         %radius of a pipe in meter
dP = 0.1;         %pressure drop across the length in Pa
i=1;
for r= -0.025:0.001:0.025
    V(i) = (dP*R^2)*(1-(r^2/R^2))/4*mu*L; % Velocity profile
    i=i+1;

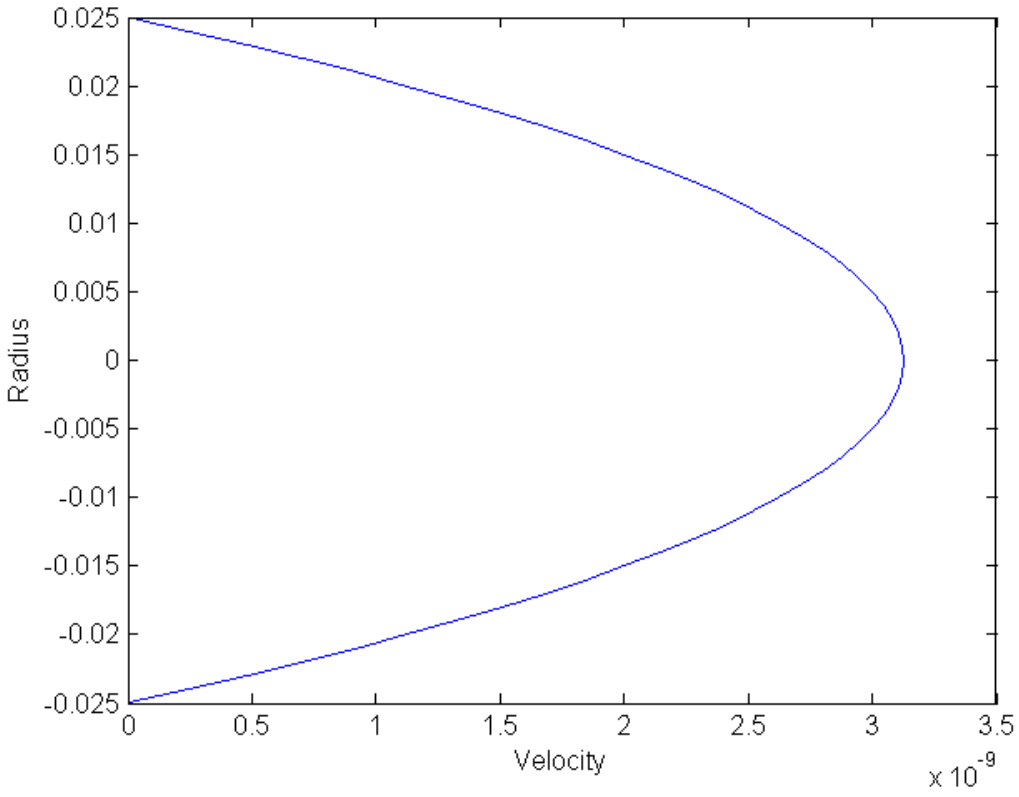
end
 r= -0.025:0.001:0.025;
 figure(2)
plot(V,r)
xlabel('Velocity');
ylabel('Radius');


%%calculating maximum velocity
```

```
Vmax = dP*R^2/(4*mu*L)
```

```
Vmax =

    0.0781
```



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