ENGR 133, Problem Set 05

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Problem 4.21

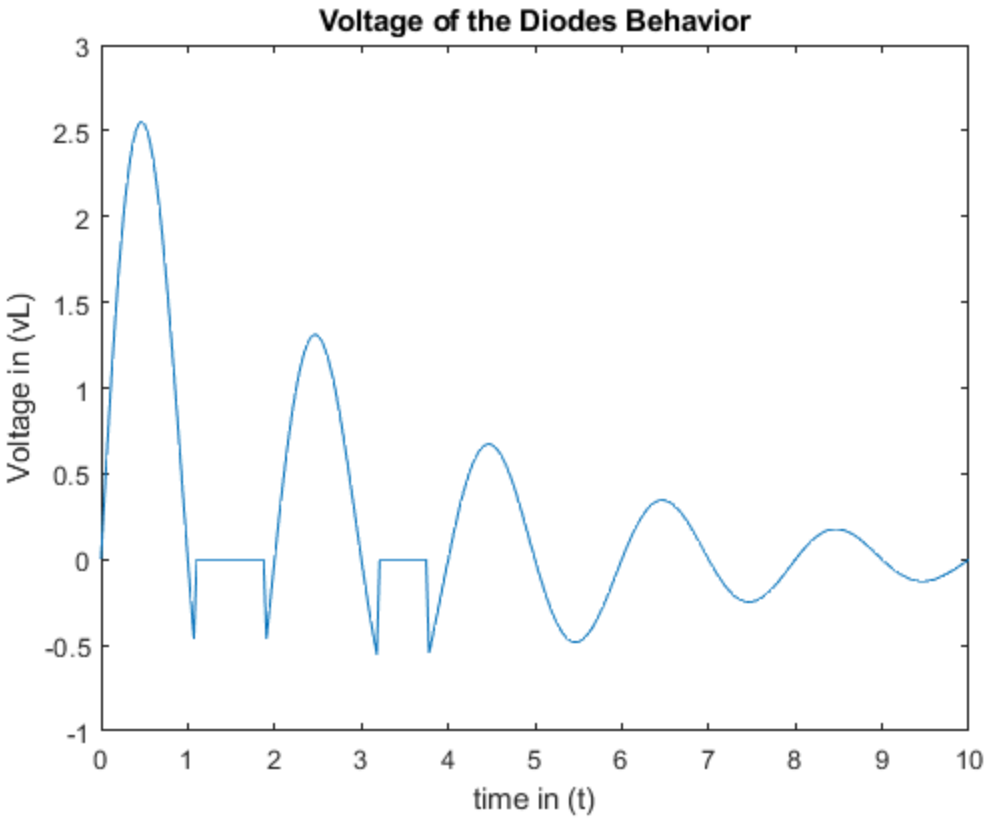
```
clear
close all
clc

% Problem Presentation
%{
Create a MATLAB function called fxy to evaluate the function f(x,y)
 defined
as follows:
f(x,y)=  xy if x>=0 and y>=0
         xy^2 if x>=0 and y<=0
         x^2y if x<=0 and y>=0
         x^2y^2 if x<0 and y<0

Test your function for all four cases.
%}

% Psuedocode
% initialize variables
% Create a function called fxy
% Display results

% Initialize variables
% x = input('Enter your x value: ');
% y = input('Enter your y value: ');

% Create a function called fxy
c1 = functionf(1,2)
c2 = functionf(2,-2)
c3 = functionf(-3,4)
c4 = functionf(-5,-6)


% Display results
fprintf('tried at each case with 4 different outputs\n')


c1 =
```

```
     2

c2 =

     8

c3 =

    36

c4 =

   900

tried at each case with 4 different outputs
```

Problem 4.28

```
clear
close all
clc

% Problem Presentation
%{
a. An ideal diode blocks the flow of current in the direction opposite
 that
of the diode's arrow symbol. It can be used to make a half-wave
 rectifier,
shown as in figure P28a. For the ideal diode, the voltage vL across
 the
load RL is given by:
vL =  Vs if Vs > 0
       0 if Vs <= 0
suppose the supply voltage is
  Vs(t) = 3e^-t/3 sin(pi*t)V
where time t is in seconds. Write a MATLAB program to plot the voltage
 vL
versus t for 0 <= t <= 10.

b. A more accurate model of the diode's behavior is given by the
 offset
diode model, which accounts for the offset voltage inherent in
 semiconductor
diodes. The offset model contains an ideal diode and a battery whose
 voltage
equals the offset voltage.
%}

% Psuedocode
```

```
% Initialize variables
% Create a for loop
% Display results

% Initialize variables
% Part a
t = linspace(0,10,300);

% Create a for loop
% part a
for k = 1:300
    vs = 3.*exp(-t(k)./3)*sin(pi*t(k));
if vs>0
    vl(k) = vs;
else
    vl(k) = 0;
end
end
% part b
for k = 1:300
    vs = 3.*exp(-t(k)./3)*sin(pi*t(k));
if vs>-0.6
    vl(k)= vs;
else
    vl(k)=0;
end
end
% Display results
plot(t,vl), xlabel('time in (t)'), ylabel('Voltage in (vL)')
title('Voltage of the Diodes Behavior')
```



Problem 4.34

```
clear
close all
clc

% Problem Presentation
%{
One bank pays 5.5 percent annual interest, while a second bank pays
 4.5
percent annual interest. Determine how much longer it will take to
accumulate at least $50,000 in the second bank account if you deposit
 $1,000
initially and $1,000 at the end of the year.
%}

% Psuedocode
% Initialize variables
% Compute the while loops
% Display results

% Initialize variables
bank_1 = 1000;
bank_2 = 1000;
years_1 = 0;
```

```
years_2 = 0;

% Compute the while loops
while (bank_1 < 50000)
  bank_1 = bank_1 + (0.055*bank_1)+1000;
  years_1 = years_1 + 1;
end
while (bank_2 < 50000)
   bank_2 = bank_2 + (0.045*bank_2)+1000;
   years_2 = years_2 + 1;
end
diff = years_2 - years_1;

% Display results
fprintf('It will take this many years to accumulate 50000 in the first
 bank: ')
disp(num2str(years_1))
fprintf('It will take this many years to accumulate 50000 in the
 second bank: ')
disp(num2str(years_2))
fprintf('Therefore it takes two more years for bank 2 to accumulate
 the same ammount\n')
```

```
It will take this many years to accumulate 50000 in the first bank: 24
It will take this many years to accumulate 50000 in the second bank:
 26
Therefore it takes two more years for bank 2 to accumulate the same
 ammount
```

Problem 4.42

```
clear
close all
clc

% Problem Presentation
%{
The following table gives the approximate values of the static
 coefficient
of friction mu for various materials.
                 Materials            mu
                Metal on metal      0.20
                Wood on wood        0.35
                Metal on wood       0.40
                Rubber on concrete  0.70

To start a weight W moving on a horizontal surface, you must push with
 a
force F, where F = mu*W. Write a MATLAB program that uses the switch
structure to compute the force F. The program should accept as input
 the
value of W and the type of materials.
%}
```

```
% Psuedocode
% Initialize variables
% Create a switch structure
% Display results

% initialize variables
weight = inputdlg('Enter the weight: ');
weight = str2double(weight{1});
material = menu('Choose the material','wood on wood','metal on
 metal','metal on wood','rubber on concrete')

% Create a switch structure
 switch material
   case 1
     F=0.2*weight;
     mat1 = "wood on wood";
   case 2
     F=0.35*weight;
     mat2 = "metal on metal";
   case 3
     F=0.4*weight;
     mat3 = "metal on wood";
   case 4
     F=0.7*weight;
     mat4 = "rubber on concrete";
   otherwise
    'Invalid input';
 end


% Display results
% this is using a menu and inputdlg function


material =

     1


```

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