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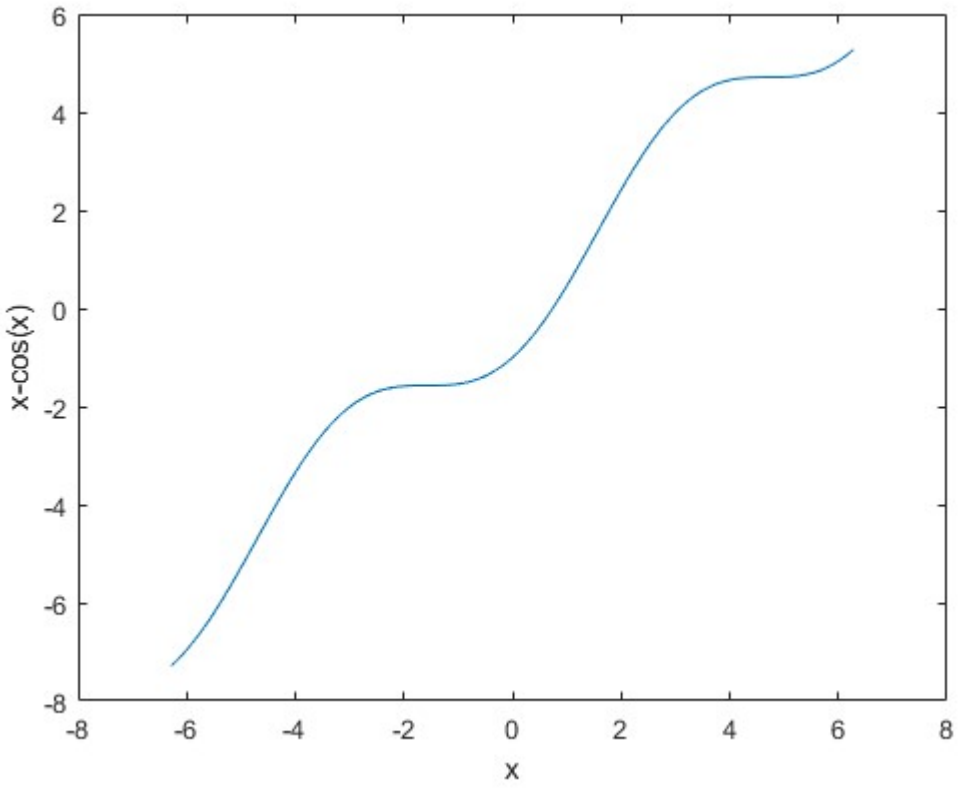
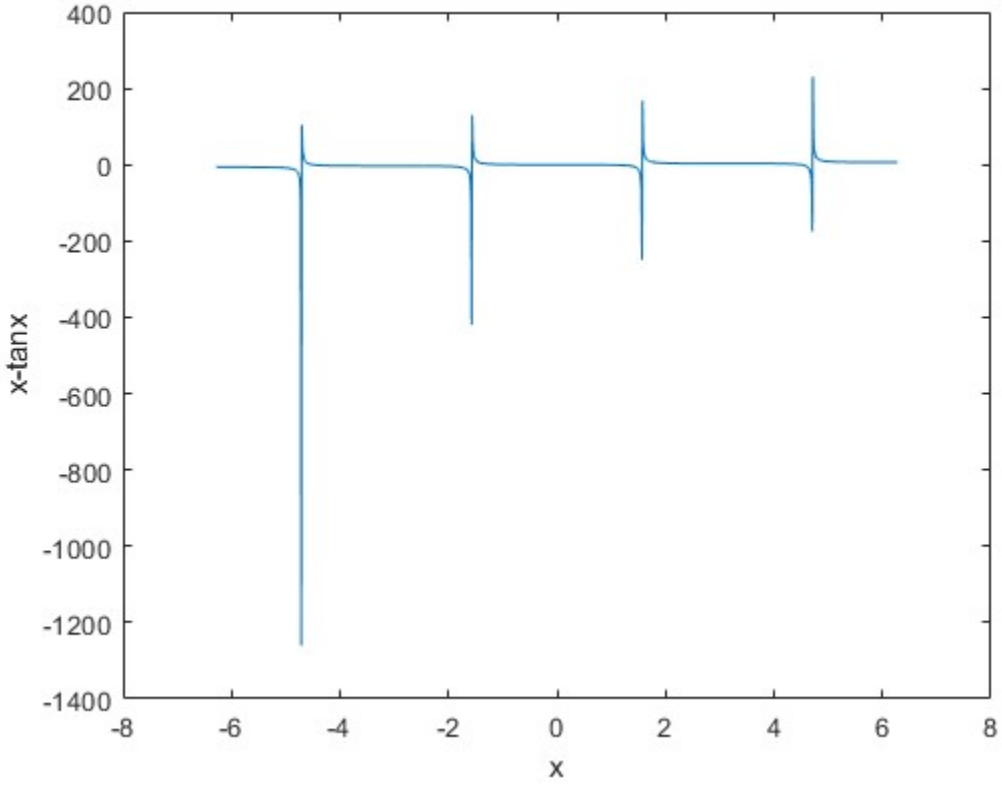
1)

```
>> x=-2*pi:0.01:2*pi;
>>Y=x-cos(x);
>>plot(x,y)
>>xlabel('x');
>>ylabel('x-cos(x)')
>>for i=1:1256
if y(i)*y(i+1)<0
disp(x(i))
end
end
```

0.7368 is the root for x-cos(x)



```
>>y=x-tan(x);
>>plot(x,y)
>>xlabel('x');
>>ylabel('x-tanx');
>>for i=1:1256
If y(i)*y(i+1)<0
disp(x(i))
end
end
```



-4.7132, -4.5032, -1.5668, 4.4868, 4,7068 are the roots of x-tan(x) obtained through this method however, -4.5032 and -1.5668 are asymptotes.

2)

```
>> x= [73 92 65 41 37 80 67 54 90 82 85 69 76 74 82 87 69 78 85]
>> grades=strings([1,19]);
>> for i=1:19
If x(i)>90
grades(i)='A+';
elseif x(i)>=80
grades(i)='A';
elseif x(i)>=75
grades(i)='B+';
elseif x(i)>=60
grades(i)='C+';
elseif x(i)>=50
grades(i)='C';
elseif x(i)>=40
grades(i)='D';
else
grades(i)='F';
end
end
>>disp([x', grades'])
"73" "B"
"92" "A"
"65" "C+"
"41" "D"
"37" "F"
"80" "A"
"67" "C+"
"54" "C"
```

“90” “A+”

“82” “A”

“85” “A”

“69” “B”

“76” “B+”

“74” “B”

“82” “A”

“87” “A”

“69” “B”

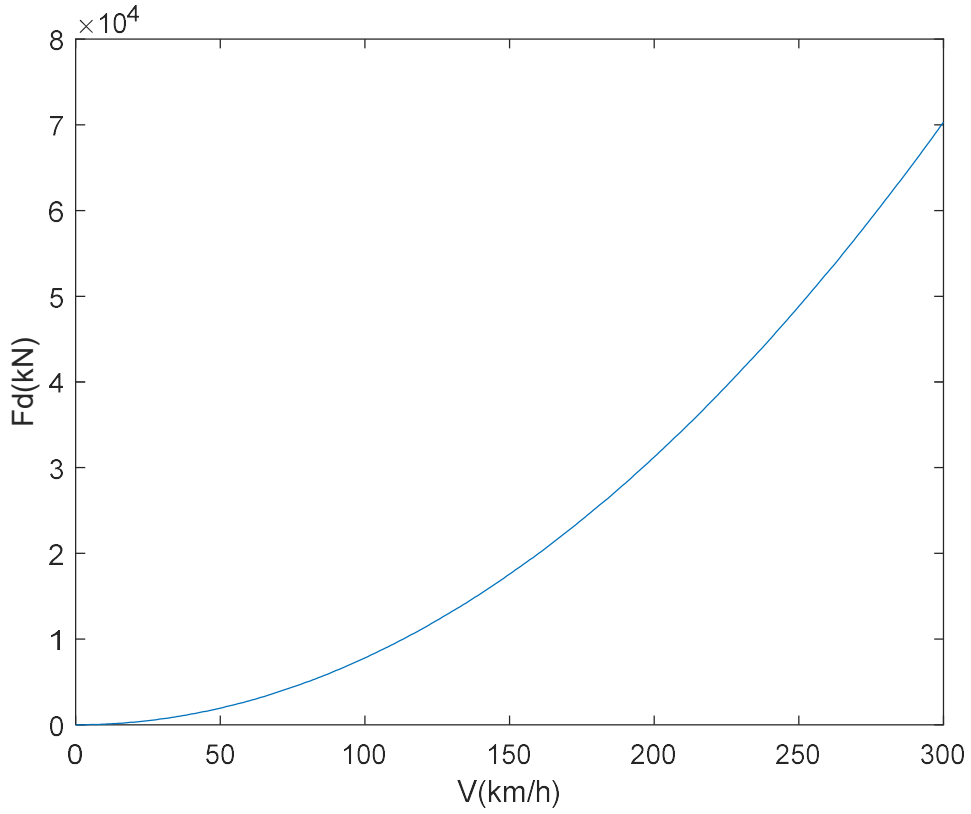
“78” “B+”

“85” “A”

3)

```
Fd=input('Please enter the measured drag force: ');
p=input('Please enter the air density: ');
V=input('Please enter the velocity: ');
A=input('Please enter the surface area: ');
Cd = Fd/(p*V^2*A/2);
V = 0:1:300;
Fd = Cd.*p.*V.^2.*A./2;
plot(V,Fd)
xlabel('V(km/h)');
ylabel('Fd(kN)');
```

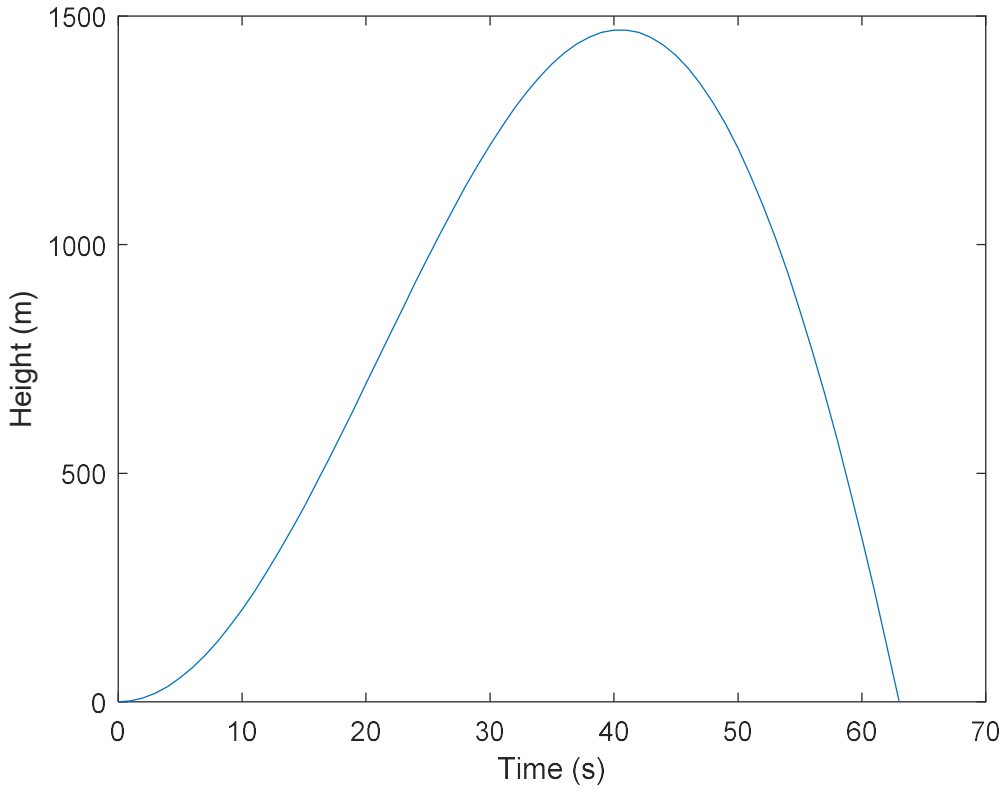
```
>> assignment2code
Please enter the measured drag force: 20000
Please enter the air density: 1*10E-06
Please enter the velocity: 160
Please enter the surface area: 0.9
```



4)

```
t = 0:1:100;
H = 2.13.*t.^2-0.0013.*t.^4+0.000034.*t.^4.751;
for i=2:100
    if H(i)*H(i+1)<0
        fprintf('The time at which the rocket reaches the ground is %d
seconds\n', t(i))
        groundtime =t(i);
    end
if H(i)>H(i-1) && H(i)>H(i+1)
fprintf('The maximum height is %d metres\n', H(i))
maxheight=H(i);
fprintf('The height is reached at %d seconds\n', t(i))
end
end
t = 0:1:groundtime;
H = 2.13.*t.^2-0.0013.*t.^4+0.000034.*t.^4.751;
plot(t,H)
xlabel('Time (s)')
ylabel('Height (m)')
```

```
>> Assignmentcode3
The maximum height is 1.469524e+03 metres
The height is reached at 40 seconds
The time at which the rocket reaches the ground is 63 seconds
>>
```



5)

```
% arrays for times for all 3 persons
personA=[4.0 1.5 6.0 0.75 12.0 72.0 0.0 0.0 4.0 2.75];
personB=[48.0 0.0 5.5 1.00 3.00 2.00 1.5 2.5 4.0 1.5];
personC=[1.0 1.5 5.0 8.0 1.5 2.0 1.5 1.75 12.0 2.0];
%strings to store parking lot type
stringA=strings([1,10]);
stringB=strings([1,10]);
stringC=strings([1,10]);
%arrays of all short time parkings
shorttimeA=zeros([1,10]);
shorttimeB=zeros([1,10]);
shorttimeC=zeros([1,10]);
%arrays of short time costs
shortcostA=zeros([1,10]);
shortcostB=zeros([1,10]);
shortcostC=zeros([1,10]);
%arrays for long time parkings
longtimeA=zeros([1,10]);
longtimeB=zeros([1,10]);
longtimeC=zeros([1,10]);
%arrays for long time costs
longcostA=zeros([1,10]);
longcostB=zeros([1,10]);
longcostC=zeros([1,10]);
%arrays for optimal costs
optcostA = zeros([1,10]);
optcostB = zeros([1,10]);
```

```
optcostC = zeros([1,10]);
%arrays for weekly costs
weekcostA=zeros([1,4]);
weekcostB=zeros([1,4]);
weekcostC=zeros([1,4]);
%check if time for a specific day is greater than 24 hours and then
%distribute it forward accordingly
for i=1:10
    if personA(i)>24
        personA(i+1)=personA(i)-24;
    end
    if personB(i)>24
        personB(i+1)=personB(i)-24;
    end
    if personC(i)>24
        personC(i+1)=personC(i)-24;
    end
    %round up long time hours
    longtimeA(i) = ceil(personA(i));
    longtimeB(i) = ceil(personB(i));
    longtimeC(i) = ceil(personC(i));
end
%calculating short term costs
for i=1:10
    if personA(i)<=0.5 && personA(i)>0.0
        shortcostA(i)=2.5;
    elseif personA(i)<=6
        shortcostA(i)=personA(i)*4+0.5;
    else
        shortcostA(i)=25;
    end
     if personB(i)<=0.5 && personB(i)>0.0
        shortcostB(i)=2.5;
    elseif personB(i)<=6
        shortcostB(i)=personB(i)*4+0.5;
    else
        shortcostB(i)=25;
    end
   if personC(i)<=0.5 && personC(i)>0.0
        shortcostC(i)=2.5;
    elseif personB(i)<=6
        shortcostC(i)=personB(i)*4+0.5;
    else
        shortcostC(i)=25;
   end
end
%calculating long term costs
for i=1:10
if longtimeA(i) <= 3
longcostA(i) = 10;
elseif longtimeA(i) <= 5
longcostA(i) = longtimeA(i)*3 + 1;
else
longcostA(i) = 18;
end
if longtimeB(i) <= 3
longcostB(i) = 10;
```

```
elseif longtimeB(i) <= 5
longcostB(i) = longtimeB(i)*3 + 1;
else
longcostB(i) = 18;
end
if longtimeC(i) <= 3
longcostC(i) = 10;
elseif longtimeC(i) <= 5
longcostC(i) = longtimeC(i)*3 + 1;
else
longcostC(i) = 18;
end
end
%analyzing to see which (long time vs short time) is optimal and assigning
%to string array
for i=1:10
if shortcostA(i) < longcostA(i)
optcostA(i) = shortcostA(i);
stringA(i) = 'shortday';
else
optcostA(i) = longcostA(i);
stringA(i) = 'longday';
end
if shortcostB(i) < longcostB(i)
optcostB(i) = shortcostB(i);
stringB(i) = 'shortday';
else
optcostB(i) = longcostB(i);
stringB(i) = 'longday';
end
if shortcostC(i) < longcostC(i)
optcostC(i) = shortcostC(i);
stringC(i) = 'shortday';
else
optcostC(i) = longcostC(i);
stringC(i) = 'longday';
end
end
%seeing the weekly cost option for long time parking
for i = 1:4
weekcostA(i) = sum(optcostA(i:i+6));
weekcostB(i) = sum(optcostB(i:i+6));
weekcostC(i) = sum(optcostC(i:i+6));
end
%analyzing if weekly cost is more optimal than short and long time and then
%replacing with $80 weekly rate
if max(weekcostA) > 80
    for i = 1:4
        if weekcostA(i) == max(weekcostA)
        optcostA(i) = 80;
        stringA(i) = 'longweek';
            for i = i+1:i+6
                optcostA(i) = 0;
                stringA(i) = 'longweek';
            end
        end
    end
```

```
end
if max(weekcostB) > 80
    for i = 1:4
        if weekcostA(i) == max(weekcostB)
        optcostB(i) = 80;
        stringB(i) = 'longweek';
            for i = i+1:i+6
                optcostB(i) = 0;
                stringB(i) = 'longweek';
            end
        end
    end
end
if max(weekcostC) > 80
    for i = 1:4
        if weekcostC(i) == max(weekcostC)
        optcostC(i) = 80;
        stringC(i) = 'longweek';
            for i = i+1:i+6
                optcostC(i) = 0;
                stringC(i) = 'longweek';
            end
        end
    end
end
%displaying results on command window
fprintf('For person A, the total cost over 10 days and the optimal parking
choices are as follows\n')
%displays the optimal cost in $
disp(sum(optcostA))
%displays array of strings to suggest optimal parking
disp(stringA)
fprintf('For person B, the total cost over 10 days and the optimal parking
choices are as follows\n')
%displays the optimal cost in $
disp(sum(optcostB))
%displays array of strings to suggest optimal parking
disp(stringB)
fprintf('For person C, the total cost over 10 days and the optimal parking
choices are as follows\n')
%displays the optimal cost in $
disp(sum(optcostC))
%displays array of strings to suggest optimal parking
disp(stringC)
```

Screenshots of results

```
>> Assignment4
For person A, the total cost over 10 days and the optimal parking choices are as follows
  109.5000

    "longday"    "shortday"    "longweek"    "longweek"    "longweek"    "longweek"    "longweek"    "longweek"    "longweek"    "longday"

For person B, the total cost over 10 days and the optimal parking choices are as follows
   113

    "longday"    "longday"    "longday"    "shortday"    "longday"    "shortday"    "shortday"    "longday"    "longday"    "shortday"

For person C, the total cost over 10 days and the optimal parking choices are as follows
   98.5000

    "longday"    "longday"    "longday"    "shortday"    "longday"    "shortday"    "shortday"    "longday"    "shortday"    "shortday"
```

```
>> Assignment4

For person A, the total cost over 10 days and the optimal parking choices are as follows

  109.5000


    "longday"    "shortday"    "longweek"    "longweek"    "longweek"    "longweek"    "longweek"
"longweek"    "longweek"    "longday"


For person B, the total cost over 10 days and the optimal parking choices are as follows

  113


    "longday"    "longday"    "longday"    "shortday"    "longday"    "shortday"    "shortday"    "longday"
"longday"    "shortday"


For person C, the total cost over 10 days and the optimal parking choices are as follows

  98.5000


    "longday"    "longday"    "longday"    "shortday"    "longday"    "shortday"    "shortday"    "longday"
"shortday"    "shortday"


>>
```