

Homework #1 (Ch3) Solution

Chapter 3 PROBLEMS

1) Problem 3.3

The M-file can be written as

```
function annualpayment(P, i, n)
nn = 1:n;
A = P*i*(1+i).^nn./((1+i).^nn-1);
y = [nn;A];
fprintf('\n year annual payment\n');
fprintf('%5d %14.2f\n',y);
```

This function can be used to evaluate the test case,

```
>> annualpayment(100000,.033,5)
```

```
year annual payment
1      103300.00
2      52488.39
3      35557.14
4      27095.97
5      22022.84
```



2) Problem 3.5

The M-file can be written as

```
function sincomp(x,n)
i = 1;
tru = sin(x);
ser = 0;
fprintf('\n');
fprintf('order true value approximation error\n');
while (1)
    if i > n, break, end
    ser = ser + (-1)^(i - 1) * x^(2*i-1) / factorial(2*i-1);
    er = (tru - ser) / tru * 100;
    fprintf('%3d %14.10f %14.10f %12.7f\n',i,tru,ser,er);
    i = i + 1;
end
```

This function can be used to evaluate the test case,

```
>> sincomp(0.9,8)
```

```
order true value approximation error
1  0.7833269096  0.9000000000  -14.8945592
2  0.7833269096  0.7785000000   0.6162063
3  0.7833269096  0.7834207500  -0.0119797
4  0.7833269096  0.7833258498   0.0001353
5  0.7833269096  0.7833269174  -0.0000010
6  0.7833269096  0.7833269096   0.0000000
7  0.7833269096  0.7833269096  -0.0000000
8  0.7833269096  0.7833269096   0.0000000
```



3) Problem 3.8

The M-file can be written as

```
function grade = lettergrade(score)
if score < 0 | score > 100
    error('Value must be >= 0 and <= 100')
elseif score >= 90
    grade = 'A';
elseif score >= 80
    grade = 'B';
elseif score >= 70
    grade = 'C';
elseif score >= 60
    grade = 'D';
else
    grade = 'F';
end
```

This function can be tested with a few cases,

```
>> grade = lettergrade(89.9999)
```

```
grade =
```

```
B
```

```
>> grade = lettergrade(90)
```

```
grade =
```

```
A
```

```
>> grade = lettergrade(45)
```

```
grade =
```

```
F
```

```
>> grade = lettergrade(120)
```

```
Error using lettergrade (line 3)
```

Value must be ≥ 0 and ≤ 100

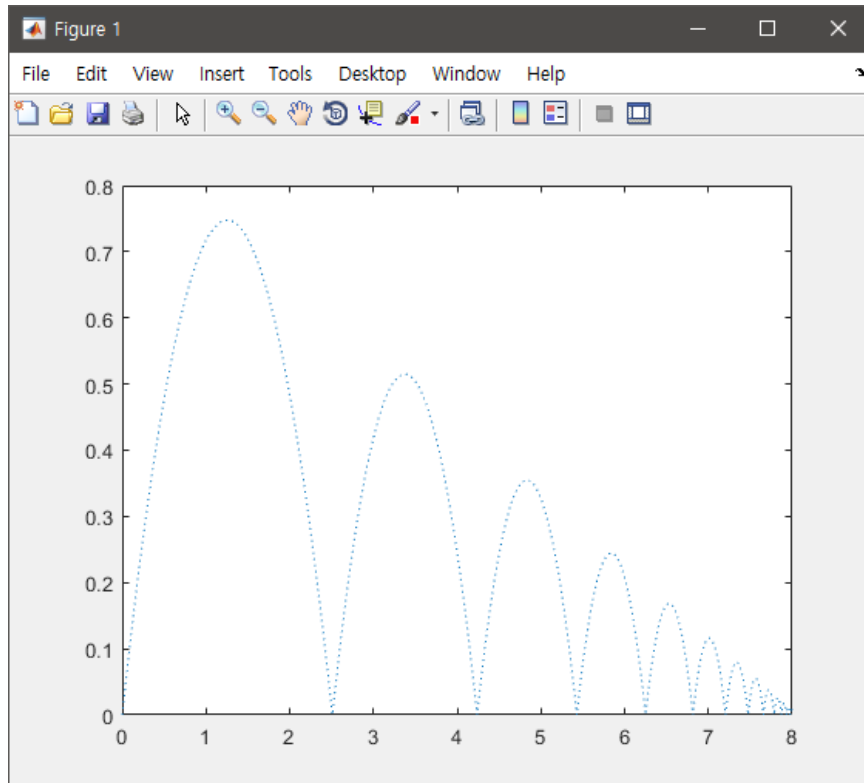


4) Problem 3.21

The script for this problem can be written as

```
clc,clf,clear
maxit=1000;
g=9.81; theta0=50*pi/180; v0=5; CR=0.83;
j=1;t(j)=0;x=0;y=0;
xx=x;yy=y;
plot(x,y,'o','MarkerFaceColor','b','MarkerSize',8)
xmax=8; axis([0 xmax 0 0.8])
M(1)=getframe;
dt=1/128;
j=1; xxx=0; iter=0;
while(1)
    tt=0;
    timpact=2*v0*sin(theta0)/g;
    ximpact=v0*cos(theta0)*timpact;
    while(1)
        j=j+1;
        h=dt;
        if tt+h>timpact,h=timpact-tt;end
        t(j)=t(j-1)+h;
        tt=tt+h;
        x=xxx+v0*cos(theta0)*tt;
        y=v0*sin(theta0)*tt-0.5*g*tt^2;
        xx=[xx x];yy=[yy y];
        plot(xx,yy,':',x,y,'o','MarkerFaceColor','b','MarkerSize',8)
        axis([0 xmax 0 0.8])
        M(j)=getframe;
        iter=iter+1;
        if tt>=timpact, break, end
    end
    v0=CR*v0;
    xxx=x;
    if x>=xmax|iter>=maxit,break,end
end
pause
clf
axis([0 xmax 0 0.8])
movie(M,1,36)
```

Here's the plot that will be generated:



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