

MAE 267 - Homework 1

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Problem 1 - Code

```
1 program pendulumPeriod
2
3 ! MAE 267
4 ! HW1
5 ! Problem 1 -
6 ! Logan Halstrom
7 ! 28 September 2015
8
9 ! DESCRIPTION: Calculate period of a pendulum
10
11 ! No undeclared variables
12 implicit none
13
14 ! DECLARE VARIABLES
15 ! Pendulum Parameters
16 real :: L, T
17 ! Constants
18 real, parameter :: pi = 3.141592653589793, g = 9.81
19 ! Input/Output
20 character(1) :: yesno
21 ! Number for i/o output
22 integer, parameter :: out_unit=20
23
24 ! Create i/o output file
25 open (unit=out_unit,file="output.txt",action="write",status="replace")
26
27 main_loop: do
28 ! GET PENDULUM LENGTH FROM USER
29 write (*,*) 'Enter pendulum length (m):'
30 write (out_unit,*) 'Enter pendulum length (m):'
31 read (*,*) L
32 write (out_unit,*) L
33
34 ! CALCULATE PENDULUM PERIOD
35 T = 2 * pi * sqrt(L / g)
36
37 write (*,*) 'Period of a pendulum of L=', L, ' (m) is T=', T, ' s'
38 write (out_unit,*) 'Period of a pendulum of L=', L, ' (m) is T=', T, ' s'
39
40 ! PERFORM CALCULATIONS AGAIN IF DESIRED
41 write (*,*) 'Perform more calculations? (y/n)'
42 write (out_unit,*) 'Perform more calculations? (y/n)'
43 read (*,*) yesno
44 write (out_unit,*) yesno
45 if (yesno=='n' .or. yesno == 'N') exit main_loop
46
47 end do main_loop
48 close (out_unit)
49 end program pendulumPeriod
```

Problem1 - Sample Output

```
1 Enter pendulum length (m):
2   10.0000000
3 Period of a pendulum of L=   10.0000000      (m) is T=   6.34373951      s
4 Perform more calculations? (y/n)
5 y
6 Enter pendulum length (m):
7   5.00000000
8 Period of a pendulum of L=   5.00000000      (m) is T=   4.48570156      s
9 Perform more calculations? (y/n)
10 n
```

Problem 2 - Code

```
1 program cableTension
2
3 ! MAE 267
4 ! HW1
5 ! Problem 2 - Tension of a Cable
6 ! Logan Halstrom
7 ! 28 September 2015
8
9 ! DESCRIPTION:
10
11 ! No undeclared variables
12 implicit none
13
14 ! DECLARE VARIABLES
15 ! Pendulum Parameters
16 real :: lp=8., lc=8., W=200., dmin=1., dmax=7., dd=0.1
17 ! Stuff that needs more precision
18 double precision :: T, Tmin=999., d, dopt
19 ! Number for i/o output
20 integer, parameter :: out_unit=20
21
22 ! Create i/o output file
23 open (unit=out_unit,file="output.txt",action="write",status="replace")
24
25 d = dmin
26 do while(d < dmax)
27 ! TENSION IN CABLE
28   T = W * lc * lp / (d * sqrt(lp ** 2 - d ** 2))
29   if (T < Tmin) then
30 ! Minimum Tension
31     Tmin = T
32 ! Length Giving Minimum Tension
33     dopt = d
34   end if
35 ! Increment d
36   d = d + dd
37 end do
38
39 write (*,*) 'Minimum Tension:', Tmin, ' lbs.'
40 write (out_unit,*) 'Minimum Tension:', Tmin, ' lbs.'
41 write (*,*) 'at optimal distance d=', dopt, ' ft'
42 write (out_unit,*) 'at optimal distance d=', dopt, ' ft'
43
44 close (out_unit)
45
46 end program cableTension
```

Problem 2 - Sample Output

```
1 Minimum Tension:   400.04690293234910      lbs.
2 at optimal distance d=   5.7000000700354576      ft
```