ASSIGNMENT No 3
Due Date: Saturday 04/12/2010, 23:55 pm (through Moodle)

DELIVERABLE:

- Your name, ID number, and section should be written on all your submitted material.

- Submit a compressed folder containing 2 files your word document file as solution to part 1 and the C++ program file (.cpp) as your solution to part2 of this assignment question. Name your folder with your ID number.

- Name your documents as HW3-ID.doc (for part 1) and HW3-ID.cpp (for part 2), where ID is your student ID number. For example, the file HW3-12345.cpp is homework 3 for a student with a student ID of 1234

- Send your compressed file named with your ID through moodle by the due date.

Part 1:

Submit a word document containing a 2-level algorithm in *pseudocode* to solve the problem described in Part2. Name your word document as HW3-ID.doc as described above.

Part 2:

A binary star is a star system consisting of two stars orbiting around their common center of mass. The brightness of a binary star varies according to the current time value during a 7 days cycle. At time t=0 days its magnitude is 2.5, and it stays at this level until t=1 days. Its magnitude is then determined by the formula:

$$3.355 - \ln(1.342 + \cos(\pi(t-0.9)/0.7))$$

until t=2 days. Its magnitude is then 2.5 until t=4 days, and it is then determined by the formula:

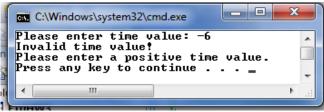$$3.598 - \ln(1.998 + \cos(\pi(t-4.4)/0.4))$$

until t=5 days. It then remains at 2.5 until t=7 days, after which the cycle repeats with a period of 7 days.

Write a C++ program which prompts the user for a floating-point time value and calculates and prints the corresponding star time value **t** within the range [0,7) and the star cycle number and the brightness of the star at time t. Your program should reject negative user time values with appropriate message and convert time values greater than or equal to 7 to a time value ≥ 0 and <7. For example, if the user enters time=6.9, your program should display star time equals to 6.9 days and cycle number equals to 1 whereas if the user enters the time =15, then your program should display star time equals to 1 days and cycle number equals to 3.

Use appropriate <cmath> library functions. Declare π as named constant equals to arc cosine (-1.0). Display program output as shown in the sample run below:

Sample Program Outputs

Select C:\Windows\system32\cmd.exe
```
Please enter time value: 6.9

Star is currently in cycle 1 at time 6.9 days.
Star brightness is   2.50
```

C:\Windows\system32\cmd.exe
```
Please enter time value: 15

Star is currently in cycle 3 at time 1 days.
Star brightness is   2.55

Press any key to continue . . .
```

C:\Windows\system32\cmd.exe
```
Please enter time value: 7

Star is currently in cycle 2 at time 0 days.
Star brightness is   2.50

Press any key to continue . . . _
```

C:\Windows\system32\cmd.exe
```
Please enter time value: 25

Star is currently in cycle 4 at time 4 days.
Star brightness is   3.60

Press any key to continue . . . _
```

C:\Windows\system32\cmd.exe
```
Please enter time value: -6
Invalid time value!
Please enter a positive time value.
Press any key to continue . . . _
```

Grading Table

Part 1 (4 Marks: level 1: 2 Mark, Level 2: 3 marks)	**/5**				
Part 2 (15 marks)	**/15**				
Implementation	0	0.5	1	1.5	2
Style (Comments, naming, Indentation)					
Declarations					
Prompt & Reading					
Negative time processing					
Out of range time processing					
Computing magnitude					
Fixed magnitude ranges					
Computed magnitude range 1					
Computed magnitude range 2					
Displaying output					
Program compiles without syntax errors					
Total	**/20**				