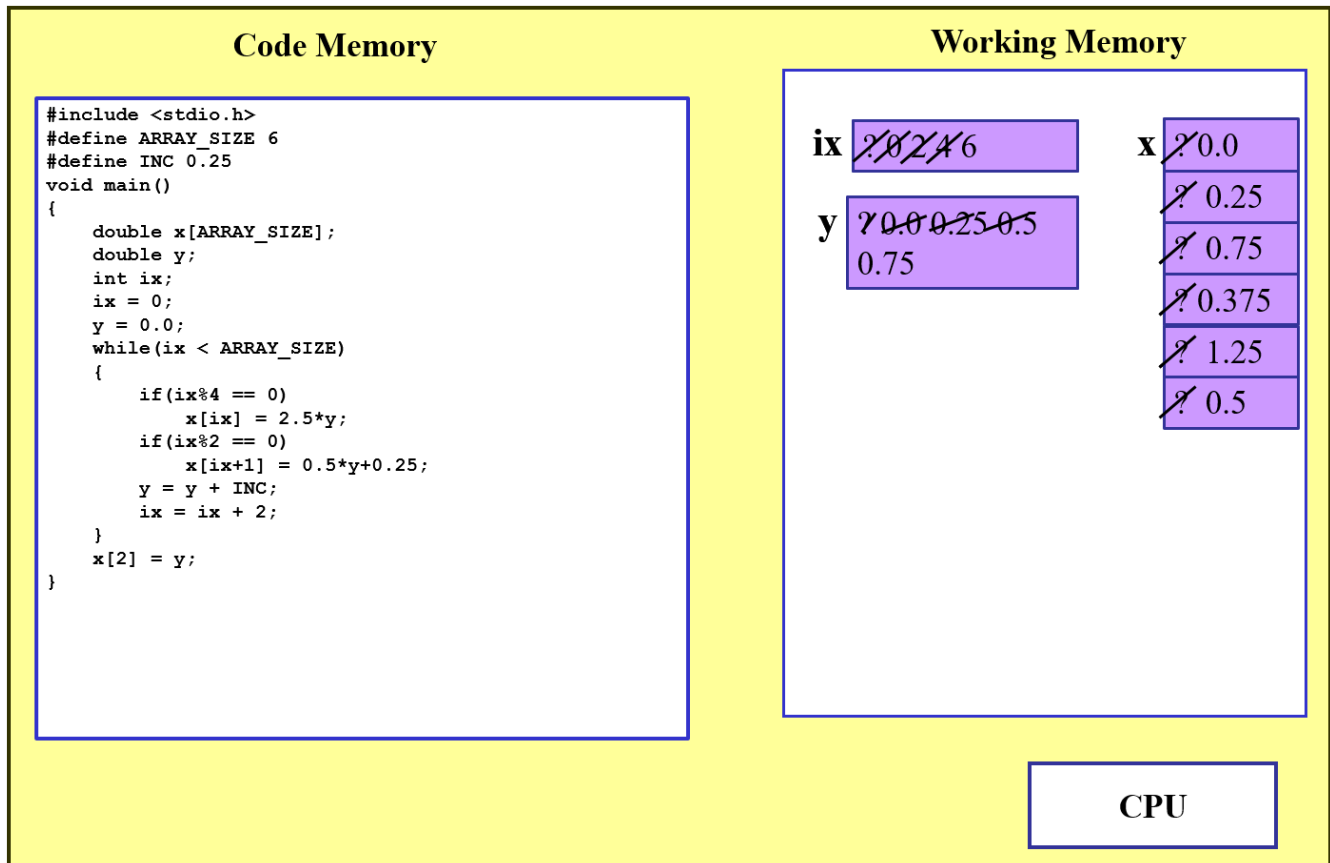


GNG1106 Fall 2017 - Assignment 5 Solution

Deduct 0 to 5 points for not submitting assignment according to instructions (in a zip file, directory, with source code, etc.)

Question 1 (5 marks)



Marking Scheme:

Defining and initialization of the array and variables in memory	1 mark
0.5 for properly creating the array and variables in memory.	
0.5 for ? in all elements in array and in both variables	
Update of values in variables	2 marks
1 for ix (deduct 0.5 if value 6 is missing)	
1 for y (deduct 0.5 if 0.75 is missing)	
Update of values for array elements	2 marks
1/3 for each element	
Total	5 marks

Question 2 (10 marks)

Output

```
D:\UofO\Courses\CurrentCourses\GN... - □ ×
Please enter a real value for x: 0.0
How many terms to use: 3
sinh(0.000000) is 0
Do you want to quit (y/n): a
Do you want to quit (y/n): b
Do you want to quit (y/n): c
Do you want to quit (y/n): z
Do you want to quit (y/n): A
Do you want to quit (y/n): Z
Do you want to quit (y/n): n

Please enter a real value for x: 1.0
How many terms to use: 0
The value of a must be greater than 0
How many terms to use: -1
The value of a must be greater than 0
How many terms to use: 1
sinh(1.000000) is 1
Do you want to quit (y/n): n

Please enter a real value for x: -1.3
How many terms to use: 7
sinh(-1.300000) is -1.69838
Do you want to quit (y/n): n

Please enter a real value for x: 57
How many terms to use: 10
sinh(57.000000) is 2.10705e+016
Do you want to quit (y/n): n

Please enter a real value for x: 57
How many terms to use: 50
sinh(57.000000) is 2.84286e+024
Do you want to quit (y/n): n

Please enter a real value for x: -5.6e-5
How many terms to use: 30
sinh(-0.000056) is -5.6e-005
Do you want to quit (y/n): y
Program terminated

Process returned 0 (0x0)   execution time : 63
Press any key to continue.
```

Marking Scheme:

Deduct 5 marks if array or structures used in the solution.

C Program

Main function (3 total marks))

Outer Do/while loop for computing sinh(x) values 0.75 mark

Instructions to compute sinh(x) and display results 0.75 mark

0.25 for each instruction (calls to getInput, sinHyper, printf)

Inner Do/while loop for getting correct input answer (y or n) 0.75 mark

Instructions for getting answer 0.75 mark

0.25 for each instruction (calls to fflush, printf, scanf)

Deduct 0.5 if while or for loops used instead of the do/while loops

Function getInput (2.5 marks total)

Comments (header) 0.25 mark

Function header/prototype 0.25 mark

Instructions to get value for x 0.5 mark

Deduct 0.25 if xPtr not used in scanf argument

Instructions to get value for n 0.5 mark

Deduct 0.25 if nPtr not used in scanf argument

Loop to repeat request for value of n if less than/equal to zero 1 mark

Acceptable to use return to provide one of the values.

Function sinh (3.5 marks total)

Comments (header) 0.25 mark

Function header/prototype 0.25 mark

Initialization of variables 0.25 mark

Initialization of i can be done in a for instruction

Loop (including incrementing i) 1 mark

Term i as an integer shall be used to control loop,

Deduct 0.25 if i declared as double,

Deduct 0.25 if starting i at 0 and using if instruction to differentiate t_0 calculation from other t_i calculation.

Can use a for loop.

Initialization of term/sinh 0.5 mark

0.25 for each initialization of each variable

Computation of value for term 0.5 mark

Computation of value for sinh 0.5 mark

Return statement 0.25 mark

Output 1 mark

This mark shall be assigned only if the program runs properly (output is given in questionnaire).

Total 10 marks

Question 3 (15 marks)

Output

```
D:\UofO\Courses\CurrentCourses\GNG1106\Fall2017\...
Please give the start time: 2.0
Please give the end time: 5.0
Time      Altitude  Velocity
-----
2.00      6994.08   2720.16
2.13      7329.26   2642.96
2.25      7654.86   2566.78
2.38      7971.00   2491.63
2.50      8277.81   2417.50
2.63      8575.42   2344.38
2.75      8863.95   2272.27
2.88      9143.53   2201.16
3.00      9414.28   2131.04
3.13      9676.33   2061.91
3.25      9929.80   1993.77
3.38      10174.81  1926.61
3.50      10411.49  1860.42
3.63      10639.96  1795.20
3.75      10860.33  1730.94
3.88      11072.73  1667.63
4.00      11277.28  1605.28
4.13      11474.09  1543.87
4.25      11663.29  1483.40
4.38      11844.98  1423.87
4.50      12019.29  1365.26
4.63      12186.34  1307.58
4.75      12346.22  1250.81
4.88      12499.07  1194.95
5.00      12645.00  1140.00

Process returned 31 (0x1F)   execution time : 46.774 s
Press any key to continue.
```

```
D:\UofO\Courses\CurrentCourses\GNG1106\Fall2017\...
Please give the start time: 1.0
Please give the end time: 44.0
Time      Altitude  Velocity
-----
1.00      3951.88   3375.52
2.79      8958.13   2248.45
4.58      12131.45  1326.70
6.38      13824.87   593.70
8.17      14361.72   32.89
9.96      14035.67  -372.30
11.75     13110.71  -638.42
13.54     11821.15  -782.05
15.33     10371.62  -819.75
17.13     8937.08   -768.08
18.92     7662.81  -643.61
20.71     6664.41  -462.89
22.50     6027.81  -242.50
24.29     5809.26   1.00
26.08     6035.32  251.06
27.88     6702.90  491.09
29.67     7779.20  704.55
31.46     9201.77  874.87
33.25     10878.47 985.47
35.04     12687.50 1019.81
36.83     14477.34 961.31
38.63     16066.85 793.41
40.42     17245.17 499.55
42.21     17771.78 63.16
44.00     17376.48 -532.32

Process returned 31 (0x1F)   execution time : 5.570 s
Press any key to continue.
```

```
D:\UofO\Courses\CurrentCourses\GNG1106\Fall2017\...
Please give the start time: 35.0
Please give the end time: 45.0
Time      Altitude  Velocity
-----
35.00     12645.00  1020.00
35.42     13069.30  1015.80
35.83     13490.78  1006.39
36.25     13907.21  991.56
36.67     14316.30  971.11
37.08     14715.66  944.83
37.50     15102.81  912.50
37.92     15475.20  873.92
38.33     15830.19  828.89
38.75     16165.02  777.19
39.17     16476.89  718.61
39.58     16762.88  652.95
40.00     17020.00  580.00
40.42     17245.17  499.55
40.83     17435.22  411.39
41.25     17586.89  315.31
41.67     17696.85  211.11
42.08     17761.66  98.58
42.50     17777.81  -22.50
42.92     17741.70 -152.33
43.33     17649.63 -291.11
43.75     17497.83 -439.06
44.17     17282.44 -596.39
44.58     16999.51 -763.30
45.00     16645.00 -940.00

Process returned 31 (0x1F)   execution time : 8.061 s
Press any key to continue.
```

Marking Scheme:

C Program	
Structure definition	1.5 mark
0.2 for each member for total of 1.0	
0.5 for <code>typedef struct { } ALT_V_BALLOON;</code>	
Main function (2.5 total marks))	
Comments (header)	0.5 mark
Call to <code>getInput</code>	0.5 mark
Calls to <code>computeAltV</code>	0.5 mark
Function names can be different than those in the solution.	
Output to display result message	1 mark
0.5 mark for the loop	
0.5 mark for output (<code>printf</code> statements)	
Deduct -0.5 marks if output is not formatted.	
Function <code>getInput</code> (4.5 marks total)	
Comments (header)	0.5 mark
Function header/prototype	0.5 mark
Do/while loop (includes use of flag sentinel)	1 mark
Prompt and get values (0.5 for each time values)	1 mark
Check time values (if instruction)	1.5 mark
if () {} (0.5 point)	
Logical expression (0.5 point)	
Instruction bloc (flag/printf) (0.5 point)	
Can also use same logical expression in while and if. Comment that use of 2 logical expressions can lead to bugs if they are not aligned. Using the flag (sentinel) means that you only need to deal with a single logical expression.	
Function <code>computeAltV</code> (5 marks total)	
Comments (header)	0.5 mark
Function header/prototype	0.5 mark
Variable declarations	0.5 mark
Computation of increment t value	0.5 mark
Initialisation/update of the time variable	0.5 mark
Deduct -0.5 mark if t used to control loop. Integer value always preferable to using real value in a loop.	
Loop for traversing the arrays for filling arrays	1.0 mark
Update of the time array (<code>rv->t[ix]</code>)	0.5 mark
Update of altitude array (<code>rv->alt[ix]</code>)	0.5 mark
Update of velocities array (<code>rv->v[ix]</code>)	0.5 mark
Output (0.5 per output)	1.5 marks
Total	15 marks