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IAX0583 Programming I

Tabulating a function $y = f(x)$

Homework I

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Declaration of originality

I hereby certify that I am the sole author of this thesis and that no part of this thesis has been published or submitted for publication. All works and major viewpoints of the other authors, data from other sources of literature and elsewhere used for writing this paper have been referenced

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Date: 05/10/2018

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Task description

User inputs a starting value A, stopping value B and step H. The conditions $B > A$ and $H, C > 0$ have to be true.

The function value y will be calculated in the following points while $x \leq B$:

A

A + H

A + 2H

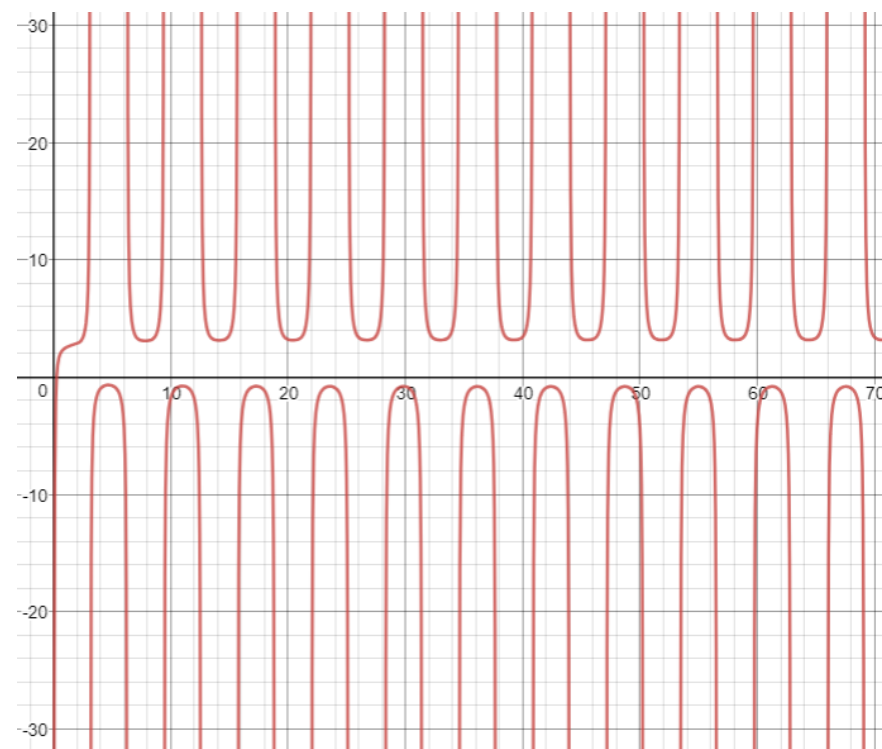
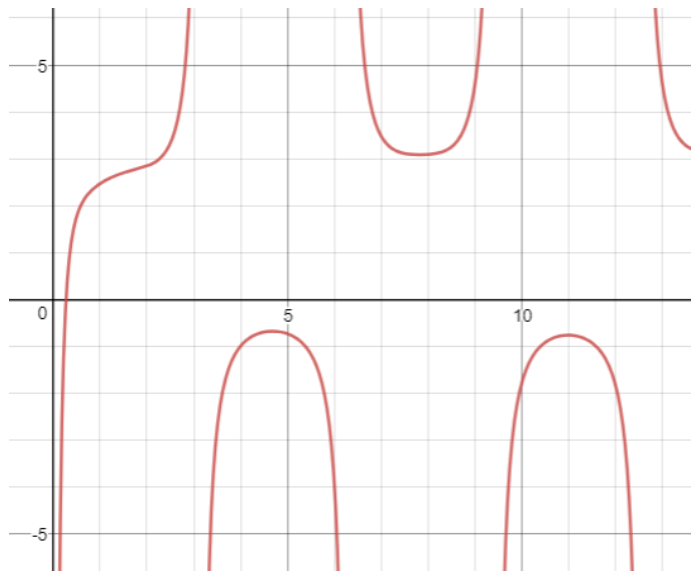
A + 3H

...

Task Number: 12 $y = (e^{\sin x} + \ln(\arctan x)) / \sin x$

Function plot

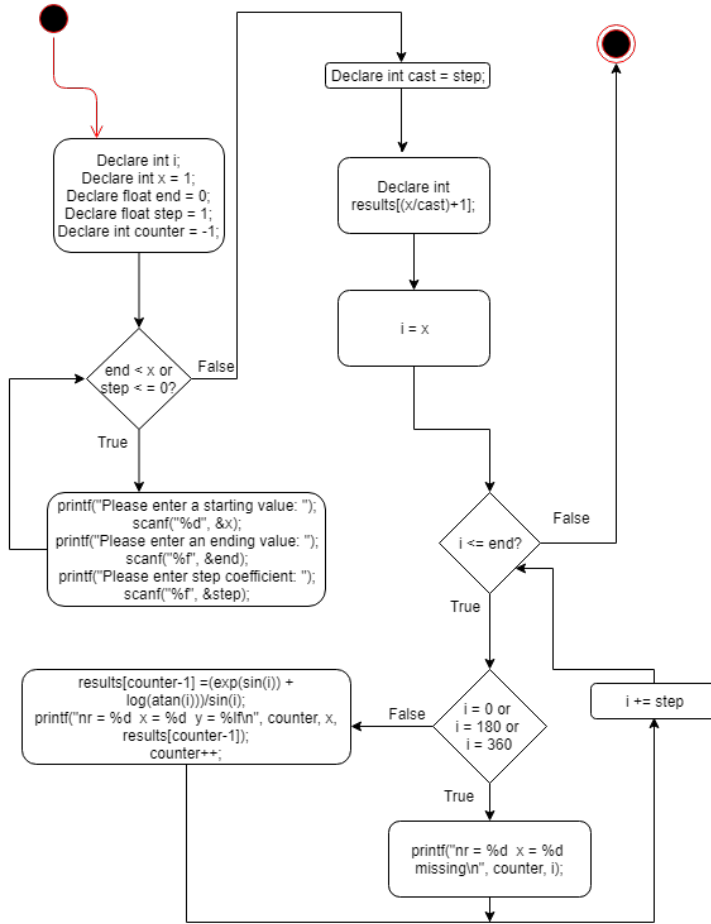
To get a better understanding of the function, I’ve included two graphs with different scales



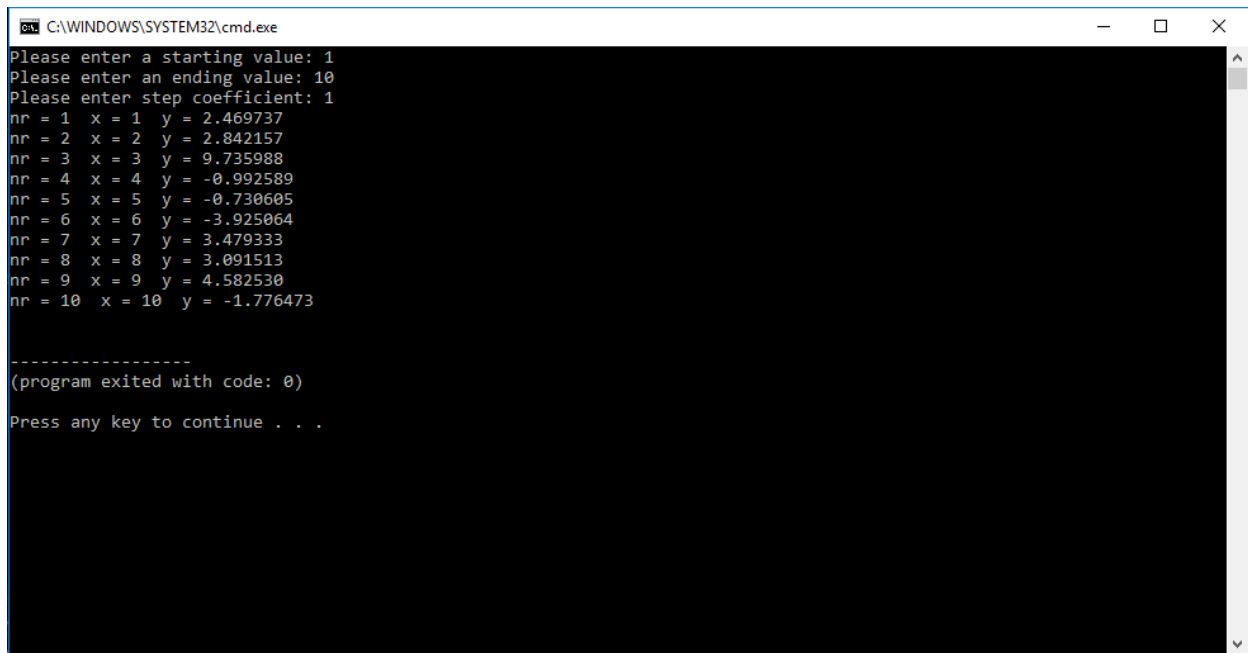
Program description

This program is made to take three values: the start value, the end value, the step coefficient. The start value, int x in the program, is kept as an int due to it only being a starting point and is never changed beyond the user's input. The end value, float end in the program, and the step coefficient, float step in the program, are both floats due to the operations performed on them. Int counter is just used to print nr and for indexing the array. It then progresses to a while loop that locks the users until they put acceptable values in. The last two variables to be made are int cast, int cast2, and float results[]. Cast casts step and cast2 casts end to ints. This is done to create the length of results with cast2/cast+1. The last part is a for loop that sets i = x, runs while i <= end, and adds step to i. This is set up like this so i will be equal to the start and will be added to by H until it reaches B. Within this for loop is the main part that makes the calculation and prints the values. It starts with an if statement that checks for any undefined numbers. This occurs when x = 0, 180, or 360. If this happens it prints the table but with "missing" in the y area. If the if statement is not true, it moves on to do the function and puts the result into an array and prints it.

Algorithm

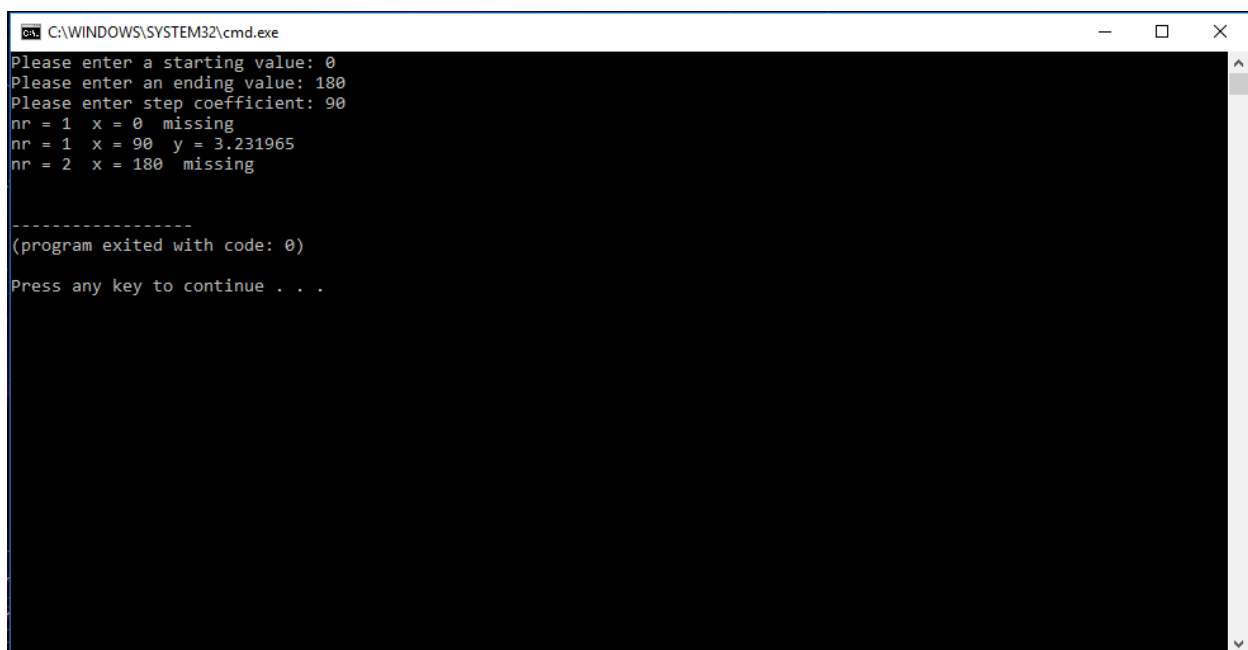


Screenshots



```
C:\WINDOWS\SYSTEM32\cmd.exe
Please enter a starting value: 1
Please enter an ending value: 10
Please enter step coefficient: 1
nr = 1 x = 1 y = 2.469737
nr = 2 x = 2 y = 2.842157
nr = 3 x = 3 y = 9.735988
nr = 4 x = 4 y = -0.992589
nr = 5 x = 5 y = -0.730605
nr = 6 x = 6 y = -3.925064
nr = 7 x = 7 y = 3.479333
nr = 8 x = 8 y = 3.091513
nr = 9 x = 9 y = 4.582530
nr = 10 x = 10 y = -1.776473

-----
(program exited with code: 0)
Press any key to continue . . .
```



```
C:\WINDOWS\SYSTEM32\cmd.exe
Please enter a starting value: 0
Please enter an ending value: 180
Please enter step coefficient: 90
nr = 1 x = 0 missing
nr = 1 x = 90 y = 3.231965
nr = 2 x = 180 missing

-----
(program exited with code: 0)
Press any key to continue . . .
```

Figure 4. Finds two missing numbers at 0 and 180