Title: Approximate trigonometry value by lookup table

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Aim: To find the approximate of trigonometry value (in radians) using reference table array for interval of 1 degree.

Methods:

a) Tools:
   a. A computer / laptop which has rust installed
   b. Visual Studio Code for IDE
b) Steps in your experiment
   1. Planning
      i. Read through the instructions, then process what should be done first such as functions or which method or loops should start with.
   2. Find the information
      i. First find some information about what values of sin cos or tan should be.
   3. Coding
      i. Proceed the steps after planning in (1) then code with trial and error.
   4. Checking the results
      i. Run the code and debugging all of the output that is it appropriate to the estimate result that expected or not.
   5. Redo the experiment by changing the number of lookup table entries.
c) Difficulty
   1. Due to misunderstood of the instruction. I have made a wrong function that to iterate through array and get the value of sin() of every degree. However, I should make a array and values that can depend on variable (Constant). Which I have to redo the code of that part.
   2. A very high sample will cause an overflow.
   3. To use the same function as sin in tan. Value 90 will be inf because tan(90) is inf which make the value inaccurate

d) Data or procedure flow diagrams
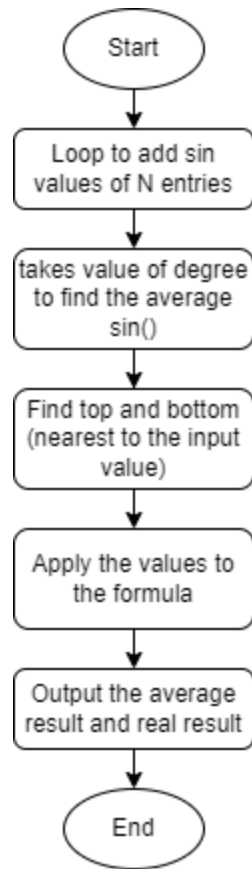
Results: Describe, in detail, your results. This will include

a) Observations
   a. The accuracy of the result compare to the compiler .sin() is proportional to the number of entries in the lookup table
b) Actual measurements
   a. These are the results of accuracy depend on number of entries

Number of Entries (N)	Average differences
91	0.1012929103341256
101	0.0042940435513708
1001	0.0004313061415757
10001	0.0000361525552852

Discussion: The result are expected, because as higher numbers of samples the more accurate the results should be.

Conclusion: As the result are expected in the **Discussion section.** The result will be more accurate as the sample in lookup table is high. However, as there is a limit of the machine, a very high number of entries will make the program overflows.

To use get the value tan that use the same function as sin to be accurate, do not use value close to 90 as 90 in lookup table will be inf so that the result will not be accurate.

Acknowledgments:
I acknowledge that all of the code written, and all of the result are addressed by myself, and all information are correct.
(Kasitphoom Thowongs)

Appendix:
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Sin value	Look up value	Computed	Differences
sin(0)	0.0000000000000000	0.0000000000000000	0.0000000000000000
sin(11)	0.1907747300075518	0.1908089953765448	0.0000342653689930
sin(20.302)	0.3468982957675781	0.3469683898617379	0.0000700940941598
sin(35.0023)	0.5735910290898897	0.5736093187594679	0.0000182896695782
sin(49)	0.7546637768230735	0.7547095802227720	0.0000458033996985
sin(57.5)	0.8432742129552937	0.8433914458128856	0.0001172328575919
sin(60)	0.8659730391584771	0.8660254037844386	0.0000523646259615
sin(78.9)	0.9812694732270478	0.9812926639922451	0.0000231907651973
sin(89.111)	0.9998793572083371	0.9998796296430030	0.0000002724346659
sin(90)	0.9999999876629946	1.0000000000000000	0.0000000123370054

Average difference: 0.0000361525552852

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Cos value	Look up value	Computed	Differences
cos(0)	0.9999999876629946	1.0000000000000000	0.0000000123370054
cos(11)	0.9816038644052409	0.9816271834476640	0.0000233190424230
cos(20.302)	0.9378482540865206	0.9378768237016805	0.0000285696151598
cos(35.0023)	0.8190517165879458	0.8191290187951462	0.0000773022072004
cos(49)	0.6559931656571651	0.6560590289905073	0.0000658633333421

	Look up value	Computed	
cos(57.5)	0.5372186510761424	0.5372996083468238	0.0000809572706814
cos(60)	0.4999546543305400	0.4999999999999999	0.0000453456694599
cos(78.9)	0.1924859999282215	0.1925219665259073	0.0000359665976858
cos(89.111)	0.0153757622813142	0.0155153544906680	0.0001395922093538
cos(90)	0.0000000000000000	0.0000000000000000	0.0000000000000000

Average difference: 0.0000496928282312

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Tan value	Look up value	Computed	Differences
tan(0)	0.0000000000000000	0.0000000000000000	0.0000000000000000
tan(11)	0.1943500193157279	0.1943803091377185	0.0000302898219905
tan(20.302)	0.3698874463496898	0.3699509158274088	0.0000634694777190
tan(35.0023)	0.7003111250158771	0.7002673639900924	0.0000437610257847
tan(49)	1.1504140840660457	1.1503684072210094	0.0000456768450363
tan(57.5)	1.5697039022492401	1.5696855771174902	0.0000183251317498
tan(60)	1.7321031650721421	1.7320508075688767	0.0000523575032654
tan(78.9)	5.0978745134345642	5.0970425957091701	0.0008319177253941
tan(89.111)	65.0295796016220464	64.4445236648890472	0.5850559367329993

Tan 90 is not defined

Average difference: 0.0651268593626599

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