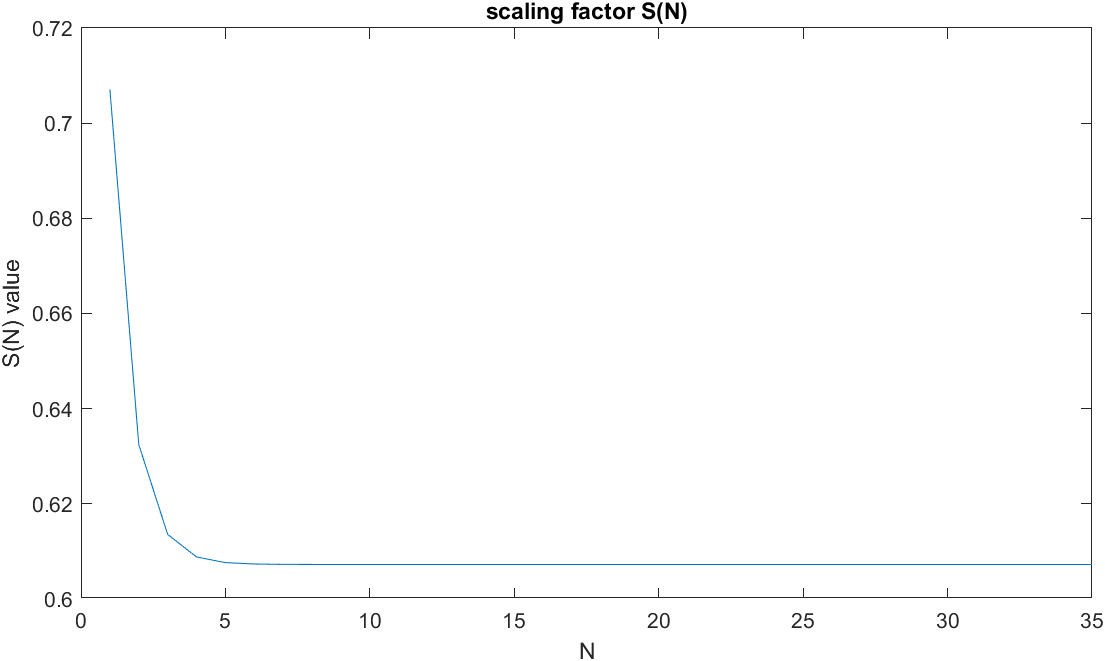
**DCCDL LAB5**

**matlab**

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1. Please show how you calculate the scaling factor, write down the 𝑁 value that you use and the result of 𝑆(𝑁).



S(N)= [0.70710678118654746 0.63245553203367577 0.61357199107789628 0.60883391251775243 ...

0.60764825625616825 0.607351770141296 0.60727764409352614 0.60725911229889284 ...

0.60725447933256249 0.60725332108987529 0.60725303152913446 0.607252959138945 ...

0.60725294104139727 0.60725293651701029 0.60725293538591352 0.60725293510313938 ...

0.60725293503244582 0.6072529350147724 0.607252935010354 0.60725293500924948 ...

0.60725293500897337 0.60725293500890432 0.60725293500888711 0.60725293500888278 ...

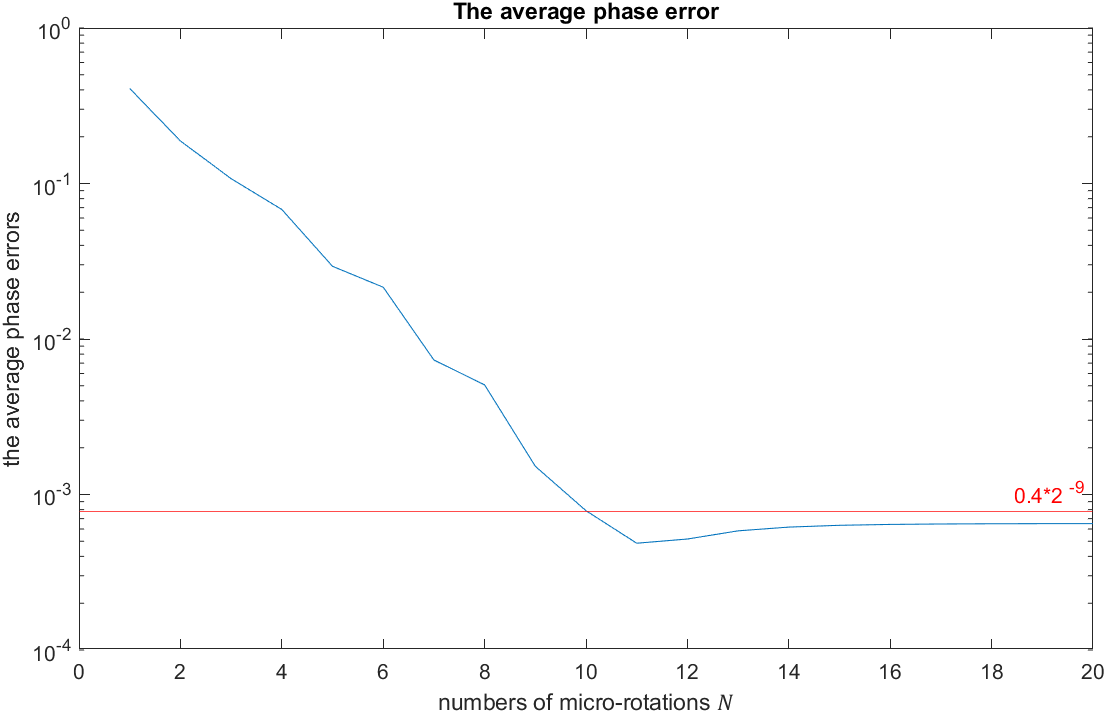
0.60725293500888167 0.60725293500888144 0.60725293500888144 0.60725293500888144 ...

0.60725293500888144 0.60725293500888144 0.60725293500888144 0.60725293500888144 ...

0.60725293500888144 0.60725293500888144 0.60725293500888144];

1. Write down the word-length of 𝑋(𝑖) and 𝑌(𝑖) that you use. Please explain it.
2. Please draw a figure to denote the average phase errors of 11 input pairs (𝑋, 𝑌) versus different numbers of micro-rotations 𝑁 and draw a figure to show the resulted phase errors of 11 input pairs versus the word-length of quantized elementary angles. Explain how you determine it. Also list a table of the elementary angles (both in floating-point representation and binary fixed-point representation).

The average phase errors of 11 input pairs (𝑋, 𝑌) versus different numbers of micro-rotations 𝑁:



the resulted phase errors of 11 input pairs versus the word-length of quantized elementary angles:

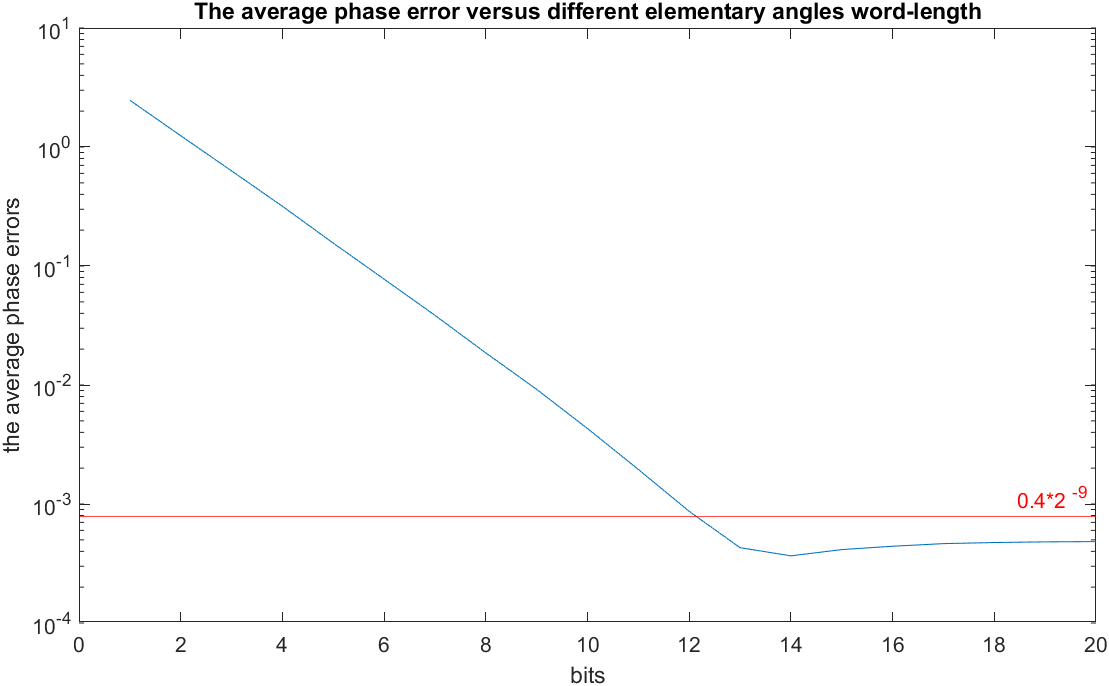


Table of the elementary angles (floating-point representation):

Table of the elementary angles (fixed-point representation):

1. Please show how you decide the number of micro-rotations for the magnitude function with error tolerance of 0.2%.
2. Write down the power-of-2 expression for the scaling factor 𝑆(𝑁). Depict your design for the shift-and-add block. (Using CSD)
3. Depict your design of the complete CORDIC architecture for the arctangent function. Mark the word-length in the block diagram.
4. Depict your design of the complete CORDIC architecture for the magnitude function. Mark the word-length in the block diagram.